Quality Management: A Study in an Amazonian Environmental Research Institute

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Declaration

I am responsible for composing this dissertation. It represents my own work and where the work of others has been used it is duly acknowledged.

Maria Goretti Macena de Castro

Abstract

This study carries out an in-depth study of the issues involved in the implementation of a quality improvement programme in a developing country. It does this by taking, as a case study, a World Bank led programme to create a Centre of Excellence at the National Institute for Amazon Research – INPA, in Manaus, capital of Amazon state, Brazil, with the aim of improving scientific research in the Amazon. The programme at INPA does not use a recognised quality management theoretical framework for improvement, but we look at how it takes into account the issues that quality management considers, and how it handles the difficulties caused by the institute's location, in a remote part of a developing country. In order to achieve this, we develop a framework based around the ideas of Total Quality Management (TQM), and Riggs' *Theory of Prismatic Societies*, which deals with the problems caused by the Institute's status. One of the frequent problems in public administration in developing countries is that prescribed norms do not correspond to actual behaviour, a characteristic defined by Riggs as 'formalism'. The research strategy adopted is qualitative, and is based primarily on semi-structured interviews. Interviews were largely carried out in Portuguese, and took place in Brasilia and Manaus. Data was also collected from the analysis of documents. In general, data analysis was mainly qualitative, but some basic quantitative analysis was occasionally used. The analysis showed us that there were serious weaknesses in the Excellence Project. Several important changes that were required, such as in the level of salaries and in the scientific management could not be made. Insufficient attention was paid to difficulties that are common in developing countries, and the presence of 'formalism' proved to be significant in explaining the failures of the improvement process. A key point of a TQM approach, that progress must be assessed and measured, did not happen, leading to a situation where INPA could not say whether there had been significant progress or not. Finally, there was no evidence to suggest an increase in the productivity of research at INPA, which is the central aim of the Excellence Project. However, our results show us that the work at INPA was less than successful, not that there is any general theoretical difficulty in applying quality management techniques to the public sector in developing countries.

I dedicate this work to my parents José Corrêa Lima (in memoriam) and Maria Macena Corrêa to whom I am most grateful for so many things, especially for all their dedication and unconditional love, for being the examples that shaped my character and also for stressing the importance of studying to their children.

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I also would like to give my special thanks to my (numerous) family for giving me all the support and love when I needed them. Especially to my mother Maria Macena Corrêa, who visited me in Edinburgh, before my PhD started, and who was always there to listen to me, to give support and to love me. Also I would like to thank my brothers and sisters: Antônio, José, Eleniê, Elisiê, Elourdiê, Vicente, Auxiliadôra, Sávio and Bosco and their respective families.

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I have had a great opportunity to meet a lot of very interesting people in this journey at the University: Birgit, Cameron P., Cameron S., Catherine, Danny, Debby, Euan, Hunjin, Marsha, Maryan, Nadia, Nina, Pauline, Sarah Wilson; Siân, Sue A., Sue K. and Yu-Kang, and outside the academic world: Aderson, Edjard, Nancy Freeman, Atala, Susan and Theresa Blackman, Patrícia, Wladia, Deborah Asencio, Lelinho, João and the Brandão family.

This project gave me also the opportunity to meet and interview many interesting people. The visit to Brazil through the project was a memorable and unforgettable experience. Although the work of the scientist needs to be detached from emotional feelings, and for that

reason the researcher needs to keep a distance in order to avoid too close an involvement with his or her object of study, as a Brazilian citizen, it was not always easy to listen to some of the criticisms of my country, its institutions and the way it is organised, especially from those from international organisations. This is despite the fact that much mismanagement can be found there.

My thanks also go to CAPES who provided me the financial support to carry out my project.

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List of Acronyms

ABC - Agência Brasileira de Cooperação
Brazilian Cooperation Agency

CAPES - Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior
Federal Agency for Post-graduate Education

CIRAD - Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement

CNPQ - Conselho Nacional de Desenvolvimento Científico e Tecnológico.
National Council for Scientific and Technological Development

DFID - Department for International Development

EMBRAPA - Empresa Brasileira de Pesquisa Agropecuária
Agricultural Research Institution

IBAMA - Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis
Brazilian Institute for the Environment and Renewable Resources

IBRD - The International Bank for Reconstruction and Development

IIHA - Instituto Internacional da Hiléia Amazônica
International Institute for the Amazon

INPA - Instituto Nacional de Pesquisas da Amazônia
National Institute for Amazon Research

JICA - Japan International Cooperation Agency

MA - Ministério da Agricultura e do Abastecimento
Ministry of Agriculture and Food Supply

MAX PLANCK - Max-Planck-Institute

MCT- Ministério da Ciência e Tecnologia
Ministry of Science and Technology

MMA - Ministério do Meio Ambiente e da Amazônia Legal
Ministry of Environment and Legal Amazon

ODA - Overseas Development Agency

ORSTOM - Institut Francais de Recherche Scientifique por le Developpement en Cooperation.

PPG-7 - Programa Piloto para Conservação das Florestas Tropicais do Brasil
Pilot Program to Conserve the Brazilian Rain Forest

PPI - Programa de Pesquisa Institutional
Institutional Research Program

PPD – Programa de Pesquisa Dirigida
Directed Research Project

SAE - Secretaria de Assuntos Estratégicos
Strategic Issues Secretary

SUDAM - Superintendência do Desenvolvimento da Amazônia
Superintendence for the Development of the Amazon

Chapter 1 – Introduction

Field of Investigation

Organisational change; public sector; research institutions; environmental research.

Public organisations world wide have been searching for models of management for improving their performance in an ever increasing competing environment in order to provide services of better quality. Scientific institutions located in developing countries have also been among these organisations which have been looking for mechanisms which can provide them with better strategies for improving the quality of the scientific knowledge generated by them. The improvement of the quality of scientific organisations is particularly crucial when their research fields involve matters of world-wide interest and attract funding from international organisations which often look for reliable world-class institutions to develop work in partnership or for those to whom they can direct their support.

The awareness of the importance of the rain forest for the environment of the planet has prompted a movement aimed at increasing and improving the generation and dissemination of scientific knowledge in the Amazon region at the same time as aiming for the preservation and rational use of its natural resources. The greater national and foreign demands for increasing the quantity as well as the quality of scientific knowledge and given its involvement in the development of scientific knowledge in a region of world wide interest and concern, the National Institute for Amazon Research – INPA has been involved in a World Bank led programme, with the aim of improving the performance of the quality of their services.

The research and scientific infrastructure in the Amazon is considerably deficient. The number of institutions and scientists in the area is low if considered alongside the large extent and importance of the region. In addition, the capacity in scientific

research has deteriorated over the years mainly due to lack of investment and non-prioritisation of scientific policies for the area. In this scenario, the performance of scientific organisations located in the area tends to be much lower than expected. Given the importance of the Amazon and the need to further the scientific knowledge about the region there is a need to improve scientific organisations located there. As one of the few research institutions located in the Amazon the National Institute for Amazon Research has been one of the two organisations chosen to improve its performance.

Background information

This study is primarily concerned with a 'sub-programme' of the World Bank lead *Pilot Program to Conserve the Brazilian Rain Forest – PPG-7,* entitled Science and Technology, and the component of the sub-programme entitled Science Centers. The Science and Technology sub-programme aims to generate and disseminate scientific knowledge essential for the preservation of the Brazilian rain forest and sustainable utilisation of natural resources. There are several donors countries to the Pilot Program and the grant awarding body for the Science Centers project is the Rain Forest Trust Fund – RFT. The amount of the grant from the RFT to the Science Centers project correspond to US$ 8.5 million (which also includes other components of the project).

Divided in two parts, the sub-programme is charged with providing support to research projects, and the strengthening of two Amazonian environmental research institutes by transforming them into 'Centres of Excellence'. The organisations are named the National Institute for Amazon Research – INPA (*Instituto Nacional de Pesquisas da Amazônia*) and the Emilio Goeldi Museum of Para – MPEG (*Museu Paraense Emilio Goeldi*).

The Institute in particular can be considered as a reference point for scientific production in the Amazon region. It is the only Brazilian research institution responsible for environmental and biological scientific knowledge generation, located in the largest remaining rain forest in the world. It is also an institution of reference for scientific development in the region. It has been for a long time

involved in international scientific co-operation with other important scientific institutions around the world. It has a significant number of scientists with a high level of qualification. With these significant characteristics of its specificity and its strategic and important location the Institute plays an important role in furthering scientific knowledge about the region.

Although the Amazon rain forest is not confined only to Brazil, the largest part of the forest is located in Brazilian territory. It is the largest of the last remaining rain forests on the planet and yet much of its natural resources are still unknown. As an important bio-diversity area, it is certainly necessary to further knowledge of that environment.

The utilisation of a quality management approach in the present research

The National Institute for Amazon Research - INPA, the organisation examined in this research, has been involved in a programme aimed at transforming the Institute into a centre of excellence. The Pilot Program mentioned above, is basically divided into four sub-programmes. One of those sub-programmes is called the Science and Technology sub-programme, which includes the Science Centers project as part of the sub-programme. Chapter 4 will provide background information about the Science Centers project and the approach for the improvement process at the Institute. As such, the Science Centers component is the one that sets the general guidelines of the excellence improvement initiative. The project is basically concerned with financing technical assistance, training, workshops, limited renovation and extension of facilities, library and collection resources, and office, electronic, field and laboratory equipment (World Bank, 1994).

The process of improvement to transform the Institute into a centre of excellence involves different activities and agencies. In a way similar to quality improvement programmes, that initiative also involves changes in the organisation in order to improve it and to make it more efficient. The process of change thus may be characterised as a quality improvement initiative, although the process at the Institute is not organised in terms of a recognised quality management approach. However, some characteristics of the quality improvement initiative at the Institute

that we will be looking at can be analysed using some of the concepts of a quality management approach as a theoretical background.

Thus, this study consists of the utilisation of a quality management approach known as Total Quality Management - TQM in the present research. TQM is an approach which has been widely used in different kinds of organisations and has been a topic of scientific investigation in organisational studies. Organisations world-wide have made use of the techniques of quality management approaches to improve the quality of their organisational performance.

Goals of the Research

This project consists of a study in the area of organisations using a contemporary administrative theory (Quality Management). It addresses an investigation of initiatives to improve the performance of a Brazilian government research institute (INPA), which is undergoing a process of reformulation in order to become a centre of excellence in environmental research on the Amazon, involving international organisations. The study intends to investigate the extent to which scientific, administrative and financial aspects are affecting the implementation of the institutional improvement programme at the Institute.

Structure of the Thesis

The thesis is structured as follows:

The present chapter is divided mainly in two parts. The first part outlines the goals of the research, addresses the research questions involved in this work and describes several of the aspects that the case-study addresses. In the second part, before exploring the literature related to this study and providing more information on the process of improvement going on at the organisation, I will be looking at the Institute, accordingly, the research institute - INPA itself is described and its organisational, physical and legal structure, human resources, scientific activities as well as aspects related to the funding of the organisation are analysed. The description of the institution can provide a general picture of the main Institute used

in this research and can show the manner in which the internal operation of the Institute occurs.

Chapter 2 explores aspects connected to the theoretical framework for this research. It starts by introducing TQM (Total Quality Management), the specific theoretical framework used as a basis to analyse the changing organisational practices due to the Excellence Programme. Some theories linked to the excellence ideas and movement are also explored. Some of those excellence initiatives are pursued through the utilisation of quality management technologies, an issue which is also going to be analysed in the present chapter. The importance of the "excellence ideal" nowadays, and how it is pursued through Quality Management, is addressed by comparing different viewpoints. The issue is then directed to the public sector, incorporating the implications of these questions for administrative practices in developing countries. Finally, we focus on peculiarities of government-funded research institutes.

Chapter 3 describes the methodological approach taken in this research. The issue of the research techniques used is then discussed. A case study was found to be the most appropriate way of carrying out the research, and the justification and implications of this decision are made clear. This chapter also gives details on the two sets of the data (outside and inside the organisation) collected, the profile of people interviewed in a total of 33 participants, the instruments and procedures used to collect data and how they were administered. The chapter also gives details about the fieldwork, which involved two visits to the Institute, one in 1997 and the other one in 1999. The great majority of interviews were conducted in Portuguese with the exception of two of them, which were conducted in English.

Chapter 4 addresses the improvement dynamics of the organisation as well as the background of the present research. It provides further information about the G-7 funded programme to conserve the rain forest, the main reason for INPA's search for excellence, discusses the improvement approach adopted at the Institute and describes the guideline documents of the improvement process.

Chapter 5 describes the results obtained, and analyses the patterns of those results and their relationship with the initial assumptions and theoretical framework.

In the first part of this chapter a short description of the participants is presented, followed by an overview of the results, so the reader can have a panoramic view of the data collected during the fieldwork. The discussion of results addresses issues related to external and internal aspects to the organisation as well as features related to quality management theory.

Chapter 6 gives a description of the international organisations and the international participants connected to INPA, which form the external background to the institute and its work. With a long history of involvement of the Institute with international scientific collaboration, I found it important to contact international agencies which have had contact with the Institute. I believe that the views of international organisations somehow involved with the Institute could play an important role for this research regarding the analysis of the Excellence Programme and analysis of the improvement process going on at the organisation. Thus, for the purpose of this study six international organisations which have had involvement with the Institute either through the Excellence Programme or through scientific or technical co-operation were contacted. The chapter also provides the international bodies' views on the Institute, and some analysis of those views, as well as a discussion of the problems arising from the context that the Institute is situated within.

Chapter 7 presents our conclusions and the contributions of the work to the dynamics of organisational improvement. The work is summarised through an analysis of all the stages of the research, and the information gained is brought together to produce our specific conclusions.

Background data for the thesis are included in the Appendices.

The next sections are going to describe and present information about the National Institute for Amazon Research – INPA.

INPA – Our case-study

This part of the thesis describes the historical aspects and institutional characteristics which make the Institute a unique organisation. Many questions concerning the

Institute and its socio-economic environment will be discussed as well as its general and particular characteristics. It starts with an overview of these general aspects and then gives more specific information about the organisation.

The manner in which a public organisation operates is affected by the context that the organisation is embedded in, geographically, politically and socially. It is therefore necessary to look at INPA and its environment at this point.

The National Institute for Amazon Research (INPA) is a scientific research institute of international renown. One of the few specialist Amazon institutions, it has greatly furthered knowledge in environmental research by devoting a significant number of experts to the task of accumulating material about natural resources in the region. These factors have contributed towards the Institute becoming an important reference centre in the region for the development of basic and applied research. The Institute has been involved in co-operative projects, developing scientific activities with national and international organisations, and also welcomes scientists from other parts of the world.

Being located in an area of special interest, the largest area of tropical forest in the world, with its very rich but largely unknown bio-diversity, the National Institute for Amazon Research (INPA) has for a long time attracted the interest of the international scientific community. In the early 1960's the Institute undertook the first scientific expeditions to remote parts of the Amazon with scientists from different parts of Brazil and from around the world. International scientists even before the creation of the Institute had already carried out expeditions in the region. The hugeness of the region and the richness of its natural resources were a source of great attraction for those groups. Given that the Institute is an important scientific base located in the Amazon, the institution has had substantial involvement with international agencies and scientists.

One of the most recent international projects in which the organisation has been involved is its participation in a broad programme which has as one of its aims, to strengthen the scientific institutions of the Amazon region. The initiatives included external support from the members of the G-7, who selected the World Bank to finance the project, and the participation of international organisations and agents.

INPA, the National Institute for Amazon Research, was one of the Institutions chosen to be included in the programme designed to strengthen the scientific organisations of the region and to be transformed into a centre of excellence. Following this a range of initiatives began to be developed at the organisation. The following sections are going to present some characteristics of the Institute, its historical aspects, information on its structure, human resources, scientific co-operation and so forth. I take this approach before giving more details of the improvement process and the international actors involved.

The historical and structural background of an organisation is often reflected in the way it performs and is organised. In the study of organisations, it is relevant to observe some of their characteristics and the environment in which they are embedded. When we are looking at a governmental research organisation such as INPA, situated in the largest country in South America, with a strategic location in the middle of the Amazon, its unique characteristics and its role in the society gives us many interesting aspects for analysis.

General Information

Brazil, located in South America, is one of the largest countries in the whole world. The Amazon, distinct from Brazil, is also characterised as being a huge region. Hurrel (1992:400) observes that "although Amazon is not limited to Brazil, Brazilian Amazon is the largest rain forest on earth. It covers 58 per cent of Brazil's total land area and accounts for around 33 per cent of the world's surviving tropical forests, larger than the combined forested areas of Colombia, Indonesia, Peru, and Zaire".

The Institute is located in Manaus, which is situated in the north west of Brazil, in the heart of the Amazon rain forest. This strategic location could be considered as an important factor for the achievement of INPA's objectives (INPA, 1994). Manaus is a city of approximately 1.5 million people. The city lies along the north bank of the Negro River, 11 miles (18 km) above its confluence with the Amazon (Solimões River). It is located 900 miles (1,450 km) inland from the Atlantic coast in the heart of the Amazon rain forest. As a major inland port (reached by ocean going vessels

from the Atlantic) it is a collecting and distribution centre for the river areas of the upper Amazon.

In the late twenties the rubber boom brought prosperity to the city. It was during this period the great Opera House was constructed. With the advent of synthetic rubber in the early 1920's, as well as development of rubber plantations in South East Asia the economic importance of natural rubber, and consequently that of Manaus declined considerably. Since then in order to encourage commercial and tourist development, Manaus has been declared a "*Zona-Franca*" (duty free zone). This move forms part of a controversial governmental programme of incentives for bringing more business investments to the city, since environmental concerns seem to be given less priorities than economic development.

There are remarkable contrasts between the regions of Brazil. The fact that many parts of these regions present such contrasting differences in characteristics such as geography, development and so on, means that it is sometimes said that Brazil has, in the same country, areas with characteristics of both the third and first worlds. Manaus is located in the North region of Brazil. The North region can be categorised as a very large, underdeveloped region. Antonio, a senior research of the Institute, illustrates in his interesting comment the regional differences in Brazil in relation to the development of scientific activities:

> "I remember the time when I used to work in the South of Brazil, and in order to catch the fish which I needed for my work I would simply take a drive in the morning. One hour later I was in the river catching fish and in the early evening of the same day I would go back to the lab with them, no problem. In the Amazon we all know that things are different. First of all we need to prepare for the fieldwork well in advance, we need a big boat, a captain and drivers to take us to the boat. We need a whole team to do the work, because we do not work with small fish - here they are very large, which need different ways of catching them. It is not possible to leave in the morning and come back in the afternoon, I need several days and this becomes very expensive. It is obvious that one hour by car costs much less than one hour in one of those big boats which we have to keep running in the river. Secondly, if you go further outside

> Manaus there is not electricity, which means that you have to bring your own means of producing energy, probably with equipment which consumes fuel. Apart from that there are a lot of other costs involved. Thus costs of scientific research in a region like the Amazon are much higher than in other regions"

These specific characteristics, location and many other aspects can also be given as examples of the difficulties associated with that location. Other problems include the distance of the region from the main cities located in the south of the country, the high cost of living in Manaus, low governmental investment in science and technology as well as in agriculture, which forces the importation of many products, with corresponding increases in their prices, and so on.

INPA is an agency of the Brazilian government, directly subordinated to MCT, one of the ministries of the central government, located in Brasilia. Much of the decision making related to INPA is taken in Brasilia, especially in areas such as budgeting and policies definition. As far as the management of the Institute is concerned it is relevant to point out here that the post of the director of INPA is set in a four years fixed term period. From 1992 to 1995 the director of the Institute was José Seixas Lourenço and from 1995 to1999, Ozorio José de Menezes Fonseca.

As a public institution which is part of the governmental administrative system, most of the administrative aspects of the management of the Institute are regulated by laws and general rules set up by the central government.

Thus, changes in those aspects of the regulation of the governmental personnel system, like policies for recruitment and payment of salaries within the civil service, are extremely hard to achieve. This is one fact which was generally highly criticised during interviews, among both internal and external participants, and is a key theme of the research.

There is no single solution for these problems. Like many other research institutes in Brazil and in other emergent economies, INPA is trying to revise the current system in order to increase its autonomy in questions like application of funding and management of personnel.

Some historical aspects

INPA was formally created on 29th October, 1952 by the Decree 31.672, by President Getúlio Vargas, and began its work in Manaus, on 27 July, 1954.

The interest in investment in science and technology during the period after the Second World War increased considerably. In several countries, investment in this sector was seen as an important part of their development. In Brazil there were also some movements towards the beginning of consolidation of scientific activities in the country, such as the creation of the *Conselho Nacional de Desenvolvimento Científico e Tecnológico* - CNPq (National Council for Scientific and Technological Development, named at that time National Research Council) and the *Sociedade Brasileira para o Progresso da Ciência* - SBPC (Brazilian Society for the Progress of the Science) (Weigel, 1994). However, Weigel, the author of the most important study of the Institute, observes that the inception of the Institute is not very connected to this emergent movement. As will be seen, the history of the creation of the Institute is closely linked with a pressure from international organisations to create, in the Amazon, an International Institute for the study of the region.

The idea of the creation of an international institute was proposed by a group of Brazilian representatives in the first General Assembly of UNESCO (United Nations Educational, Scientific, and Cultural Organisation), in November 1946, in Paris (Fonseca, 1958, cited in Weigel, 1994). The initial idea was to establish an Institute which would be called *Instituto International da Hiléia Amazônica* (IIHA), to be located in Belém, capital of Pará state. The organisation would be designed to be managed by a group composed of international agents, would reach the whole of Amazonia and would have the financial and technical support of UNESCO (Weigel, 1994; Rodrigues et al., 1981).

Following those events a second meeting was planned to take place in Belém (Pará), with participation of a scientific international committee composed of representatives of the countries which would be establishing the Institute. The meeting would be intended to define the organisation of the Institute.

Many controversies were generated in relation to these events. Although very warmly welcomed at that time, the proposal to create an international organisation in the Amazon region was later highly criticised. During that period there was already great debate about the Amazon and its importance to the planet. Weigel (1994:249) observes that:

> "the new perspectives generated by the nuclear energy and the economic possibilities open by the development and intense application of the science and technology, the perspectives of a new period of stagnation of the Amazon after a short period of advance in rubber economy during the war, as well as an imminent internal and external interest for the economic potential represented by its bio-diversity, were some of the factors which originated a great scientific interest in relation of the region"

On the other hand there was also on the Brazilian side a great concern about the possible internationalisation of the Amazon. Thus it was believed that the importance, huge size, and richness of the Amazon region would be reasons why it should be studied by a national institution, and this was seen at that time as a question of national sovereignty. The idea behind the sovereignty issue that seemed to be implied in those criticisms was that it is the right of a country to make use of its natural resources according to the priorities set by the country itself. Thus those movements in the direction of setting up an international organisation in the country with exclusively international management could be seen by the Brazilian government as a possible threat to their control over the area. The initial idea of an international institute was then rejected, and the establishment of an Amazonian national institute was approved.

These sovereign concerns were even clearer in the designing of the initial organisational mission statement which included a special reference to the Institute as a mark of national sovereignty over the Amazon region. However the purpose of the organisation was not clearly defined. As Weigel (1994:256) points out:

> "the pretension of the creation of the IIHA represented a threat for the domain and control of this huge area of the national territory, and most important of all, a threat in relation to a formal control over an area of

> potential accumulation not properly explored yet. What seems evident is that the establishment of the sovereign vanished in the formal act of creation of INPA, to the extent that the institutional perspectives already appointed to ambiguous objectives"

As hinted in the above extract, the Institute's objectives were not made entirely clear at the outset. The lack of clear definition about the real role of the Institute can only be perceived in retrospect. This lack of definition is reflected in the lack of clear institutional objectives and probably as a result of that in the difficulty of specifying their scientific research priorities. On the other hand, on a national level, the science and technology objectives in relation to the subject of study of the Institute or to the region as a whole are also not clearly defined.

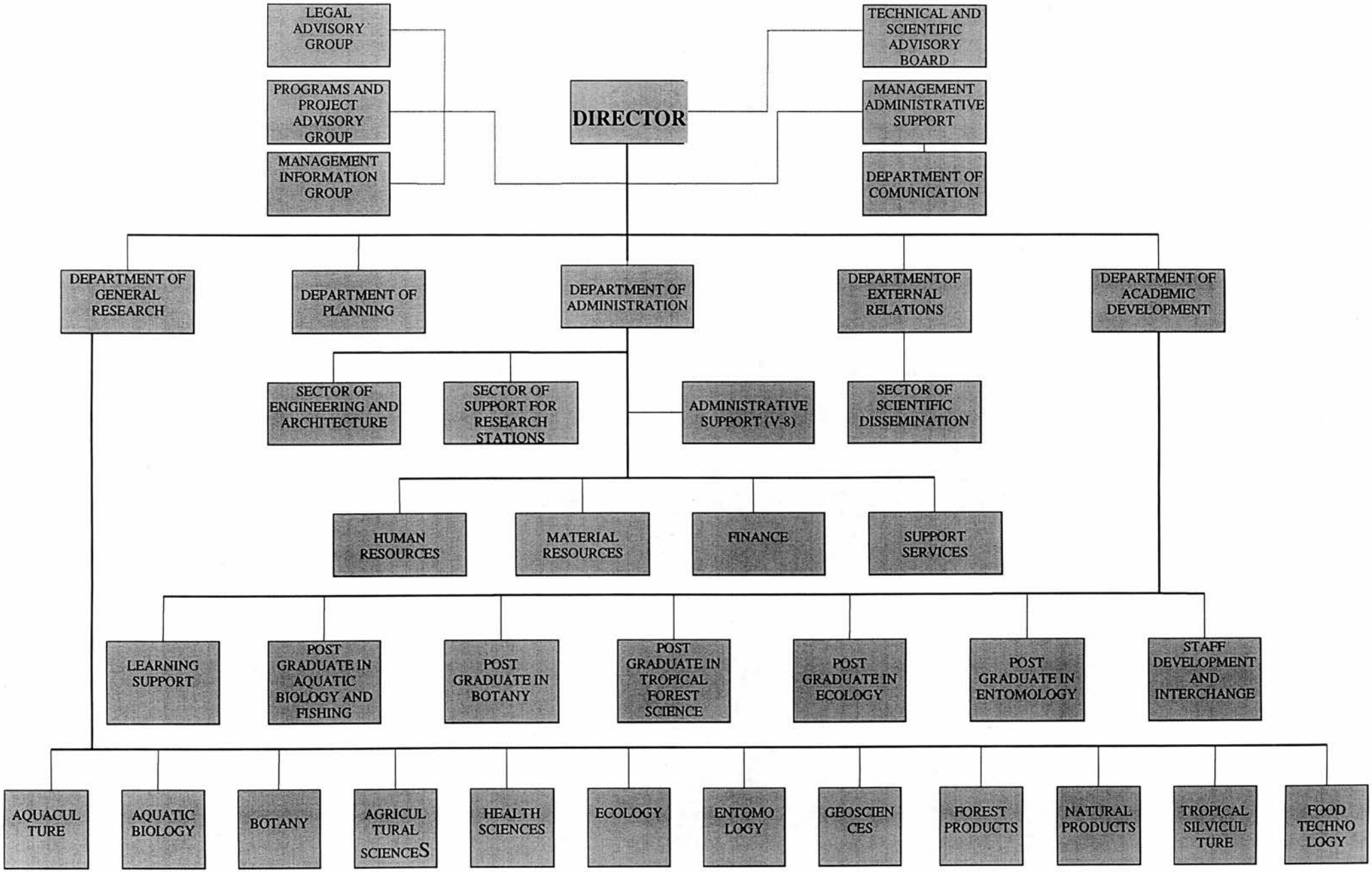
In addition Weigel observed that the formal existence of the Institute appeared to be a symbol which confirmed national sovereignty over the Amazon region. However the future plans for its performance, far from confirming that, maintained the continuing trend to the internationalisation of the research and exploitation of the natural resources of the region.

After its establishment, the Institute took a long time to define its legal, structural and scientific characteristics. The organisation in its first years did not have a definitive place and occupied several different buildings around the city of Manaus. Only after 1969 the consolidation of its infrastructure started to occur on the site that is now the main campus (Campus Aleixo I).

Organisational Structure

In its organisational structure INPA has about 38 organisational units. Among those units it has 12 research units. These administrative units in the organisational structure are called Co-ordination (or research departments), thus, the research departments are: Aquatic Culture, Aquatic Biology, Botany, Agricultural Sciences, Health Sciences, Ecology, Entomology, Geo-Sciences, Forest Products, Natural Products, Tropical Silviculture and Food Technology. The Institute also includes a library, a computing section and several laboratories. The following Figure 1 will present the organisational chart of the Institute.

Figure 1 - Organisational chart of INPA



Another relevant part of the structure of the Institute is its scientific collections. These scientific collections include a herbarium which holds more than 200,000 specimens, and zoological collections which includes different kinds of fishes, reptiles, birds, mammals and other animal samples totalling about 21,844 specimens, including 12,500 types of fish (INPA, 1997b).

Physical Structure

In the early 70's the Institute started the movements towards consolidation and the building of the main campus of the Institute, where most of the administrative areas of the organisation are located (Campus Aleixo I). This period, according to Weigel (1994) coincides with the so-called *Milagre Econômico* (economic miracle, literally), in the presidency of Emílio Garrastazu Médici. The author observes that this campus was originally built during the period of the management of Paulo de Almeida Machado, and from its original features, some more buildings has been added.

The Institute occupies an area of land of 385,186.49 m2 in Manaus (INPA, 1997)[1]. That area is divided between 3 different campuses, all near to each other. The neighbourhood where these campuses are located in Manaus is called Aleixo. Thus these campus are commonly known as Campus Aleixo I, which is the biggest of them all and where the main headquarters (along with some of the Research Departments) of the Institute is located, Campus Aleixo II and Campus V-8. The V-8 campus is named after the road which lies in front of that Unit. Table 1 specifies some of the areas occupied by the Institute.

[1] There is no page numbers in the cited document.

Table 1 - Physical units of the Institute

UNITS	GROUNDS AREA	BUILT AREA
Aleixo I	256.736,49 m2	16.459,00 m2
Aleixo II	46.000,00 m2	5.907,20 m2
V-8	75.000,00 m2	7.788,53 m2
TOTAL	385.186,49 m2	30.746,76 m2

Source: INPA, 1997.

Apart from those campuses (Aleixo I and II and V-8 campus) the Institute has three floating research bases, four natural biological reserves totalling 11,832 hectares, and 3 experimental stations of 18,910 hectares (INPA, 1997) for the development of some of their scientific research activities. Each of these reserves or stations are usually connected to a specific research division of the Institute, for example, the fruit experimental station, which is mainly managed by the Agricultural Research Department. In addition to those units the Institute has also got other research units which are located in the cities of Rio Branco, capital of the state of Acre; Boa Vista, capital of Roraima and Ouro Preto D'oeste, in Rondônia. The latter has got a natural reserve of 138 hectares.

On the campus there are around 40 buildings where these administrative and research units operate. On the main campus (Aleixo I), we find the central management of the Institute, the departments of Administration, Planning, and the research departments of Health Sciences, Forest Products, Natural Products, Aquatic Biology, Botany, and the Department of External Relations, the Library, and so on. At the campus called Aleixo II, the main operation is the Entomology Research Department whereas the Research Departments of Agronomy, Ecology, Food Technology, Aquatic Culture and Tropical Silviculture are situated on the Campus V-8.

The institutional buildings are generally of one or two floors, small, and spread around these campuses, separated from each other. In relation to the physical arrangements of the scientific units, small research departments may occupy only

one building whereas bigger ones, such as the Aquatic Biology Department, occupy several. The buildings on campus Aleixo I, where I was allocated during the fieldwork, are surrounded by natural vegetation where sometimes small wild animals can be seen.

Institutional Scientific Activities

The Institute is mainly involved in scientific activities related to biological sciences. INPA's main broad areas of research are on the protection and conservation of natural resources, social and health sciences, multiple use of Amazon soils, and technological uses for natural products. These lines, according to the MOD (World Bank, 1994:26) "have provided the basic knowledge essential for future use and conservation of the natural resources and genetic potential of the largest tropical humid forest in the world". Its main lines of research are inserted into research programmes which, according to the Research Agenda, comprise studies in the following areas: (1) Comparative Biological Studies in the Amazon, (2) Neo-tropical Biology and Ecology, (3) Management, Technology and Use of Natural Resources of the Amazon Forest, (4) Rural Production Systems, (5) The People in the Amazon Environment, and (6) Water Resources and Climate. More details related to how the research agenda was defined, its contents and connection with the organisational improvement process are going to be given on the Institutional Strategic Plan section in Chapter 4.

As can be observed in its institutional chart presented earlier as Figure 1, in relation to its scientific structure the different scientific departments of the Institute or its organisational units seem to be classified accordingly to their specialities. The classification of those units is generally mainly related to specialities considering some different aspects of the biological sciences.

That kind of arrangement would apparently facilitate the development of the scientific knowledge. However this organisational arrangement does not seem to allow a good interaction in practice between different scientific units. As each of them are organised according to their own area of knowledge and speciality, the

whole structure appears to find it difficult to integrate, as each group or individual is confined to its own area without much knowledge of the activities carried out in other units. The organisational chart also indicates the *Coordenação de Pesquisas* (General Research Department), which is designed to act as an intermediate between the various institutional research departments and the management of the Institute. However there are some circumstances in which this interaction does not seem to take place.

Weigel (1994), also observed that the scientific structure adopted at INPA shows a set of scientific departments seeming to comprise a great variety of different aspects of the study of the Amazon region. They seem to be structured to allow a satisfactory performance of the generation of scientific knowledge and the achievement of the organisation's goals. However, Weigel criticises the Institute's organisation arguing that, in fact, this may show only a superficial form of structure, and that a more detailed analysis of the institutional scientific structure can reveal a great fragmentation of scientific activities and in the development of disconnected researches in different research departments. Research is generally restricted to the limited conceptualisation of each scientific specialisation and there is no clear connection between research units. The system seems to suffer from a lack of scientific integration between institutional units which may result in producing dissociated scientific knowledge with only limited interaction.

The lack of central strategic planning seems to be holding back the development of the scientific activities of the Institute. An institutional planning system would be a means to integrate the research units scientifically as well as geographically to the achievement of the institutional goals.

Although INPA is essentially an institute of research and not an academic institution, the Institute has got a *Convênio* (a kind of contract commonly used in Brazilian public organisations) with the local university *Universidade do Amazonas* (Amazon University) for the management of postgraduate courses. These courses are at both MSc. and PhD levels. The department responsible for the general management of these courses at the Institute is the Department of Academic Development. Five sections, which are directly subordinated to that department, are

responsible for each of the postgraduate courses of the Institute. This is shown in the table of the organisational chart of the Institute (Figure 1). The postgraduate courses are in Fishing and Fresh Water Biology, Botany, Ecology, Entomology and Tropical Forests Science. The first four courses have got postgraduate courses at MSc. and PhD. levels whereas the last one has got a postgraduate course only at MSc. level.

In addition to those scientific activities, as an Amazonian research institution, INPA has, since its creation, been involved in much work related to scientific co-operation with national as well as international organisations. Apart from scientific co-operation, there are other types of collaboration between the Institute and other organisations, which fall under the headings of Technical Co-operation and Financial Co-operation.

More detailed information about the scientific co-operation at the Institute, the international organisations contacted, the kind of co-operation in which these international organisations were involved with the Institute, the international context in which the Excellence Programme is being carried out, as well as some aspects related to the improvement process going on at the Institute, will be presented later in this thesis.

Legal Structure and the Institutional Mission

As observed earlier, the Institute was officially created in 1952. The creation of INPA is connected to a reaction of the Brazilian government against the creation of an institute which would have been international and would have been responsible for carrying out scientific studies on the Amazon region. Since its creation, the organisation was initially subordinated to CNPq, which is a governmental council for scientific and technological development. This developmental agency is responsible for the support of many scientific activities in the country such as general administration of research issues and funding, human resources development, concession of grants, and so on. In its initial mission it was stated that the Institute would be responsible for scientific studies of the natural environment and of the life conditions of the Amazon region, whilst having in view the human

well-being and issues concerning the culture, the economy and national sovereignty over the Amazon.

In April 1987, following an administrative reform at a governmental level, the Institute left its previous subordination to the CNPq (*Conselho Nacional de Desenvolvimento Científico e Tecnológico*). INPA then became an *órgão da Administração Direta* (a higher hierarchical position) subordinated to the Ministry of Science and Technology – MCT (*Ministério da Ciência e Tecnologia*).

This move has resulted in changes in the objectives of the Institute. According to its new objectives for its new position, the Institute becomes responsible for promoting and developing studies, scientific research and technological development related to the natural environment and to the social, economic and cultural environment of the Amazon region, engaging in activities related to dissemination, while having in view the application of scientific and technological knowledge for the regional development, according to the policies defined by the Ministry of Science and Technology (INPA, 1993).

The Institute, which was previously on the fourth level in the line of hierarchy in the chain of command of the government, went up to the third level in the governmental hierarchical position. This movement produced changes in its legal status, as the Institute was transformed into an autonomous agency of the central government. Although this enabled the Institute to have a bit more administrative and financial autonomy, this caused difficulty as the Institute had to handle many new issues itself, as pointed out in some interviews. The specific shift mentioned above brought some difficulties in the management of the day to day activities in the Institute. CNPq, to whom INPA was initially subordinated, had been providing the Institute with support in many managerial and scientific areas. Many administrative tasks, for instance, were handled at CNPq. In this change to control to the MCT, and as an autonomous agency, the Institute had to deal with its self-management in many aspects.

In 1990, with the government of president Fernando Collor de Mello's administrative reform, further rearrangements of governmental offices were made.

Consequently, as often occurs at the beginning of management of a new government, this produced new changes in the public administration and in many offices of the government. On this occasion the Ministry of Science and Technology was dismantled, and reformed as the Science and Technology Secretariat instead. The autonomy given to the Institute was now only through formal authorisation of specific activities. The Science and Technology Secretariat would formally delegate competence for a particular task to the Institute to perform. That meant that the Institute would be allowed only to make decisions where they had been authorised formally to do so. This again created new constraints for the performance of the Institute. There is, however, no evidence that any changes were made in the mission of the Institute.

It can be observed that the initial mention of national sovereignty, discussed on the previous section, does not appear any more in the definition of the second mission, in 1987. This might indicate that that concern does not seem to be as important as it was in the initial period. Although the links between the utilisation of the scientific knowledge and the regional development appear in a more clear form in the statement of the 1987 mission, the concern to use that knowledge for the benefit of the local population appears more clearly and strongly in the definition of the mission set out in 1994 in the strategic planning exercise, which is going to be discussed in Chapter 4. The mission statement of 1994 gives a more clear, specific and directed definition of the Institute's objectives and aims.

It could be observed that the strong concerns about the interference in the national sovereignty of the country become less stressed over the years. However, the international influence on national scientific politics still today seems to be present. The design of the PPG-7, for instance, may still present a strong interference from international organisms over the national politics. However, in this case the threat does not seem to be in relation to the creation of a new institution or the take over of the Institute in particular.

Human Resources Aspects

This part of the chapter is going to analyse human resources aspects of the Institute. According to an institutional report (INPA, 1997b) the total number of staff in 1996 was 802 employees. From those eight hundred and two employees thirty-one have different contractual arrangements and such are not part of the permanent staff of the Institute once they are only temporarily contracted.

As it could be observed above, the Institute has always been a public organisation linked to Central Government agencies. As such it has always been part of the structure of the governmental civil service and as a consequence of the Brazilian governmental personnel system.

As far as the civil service is concerned there were two main broad laws regulating personnel system of the Brazilian civil service. Those were the *Consolidação das Leis do Trabalho* – CLT (Work Legislation Regulation) and the *Regime Estatutário* (State Personnel Legislation). Most of the public agencies would adopt one or the other of these legislation and in some agencies the personnel system would make use of both legislation in the organisation. The legislation would give general guidelines for the activities connected to the management of the personnel system in Brazil.

However, in 1990 Brazilian government set up, a national personnel system called '*Regime Jurídico Único*' which is a system of unified legal rules. The system is intended to set general and equal rules regarding personnel management for the whole civil service in Brazil in terms of admission, leaves, transference, retirement and so forth. As a public organisation the Institute is also subject to these general rules. Although the set up of this system has provided unified rules for the management of personnel in public organisations, its general guidelines do not give very much flexibility for the performance of organisations in this area of administration.

As such, it can be said that the Brazilian government has got an administrative system which can be characterised as highly bureaucratic. The Institute is part of the national personnel system for the civil service which includes several generalised rules for the whole of the civil service. The personnel system does not allow for the

varying needs of different institutions, which can be affected by a number of localised phenomena, as discussed earlier. It also does not take into account the possibility of programmes such as the Excellence Programme, and what may need to be done to ensure such a programme is a success. Those general rules which must be followed by the Institute restrain its institutional performance and prevent the organisation from having more autonomy. Recruitment of staff for instance usually involves a lot of bureaucracy, where people have to be recruited through open selection, and the whole process usually takes a long time to conclude.

Funding

INPA, as a governmental institution depends heavily on federal funding. As a scientific research institution which is reliant on central governmental funding, the history of the Institute is strongly marked by successive long periods of crisis with short times of stability. Periods of financial cutbacks by its main funding agency, also caused difficulties in getting projects approved. These moments of crisis weakened the performance of the institute.

As such, the largest part of the budget for the Institute comes from the Central Government, through MCT. Public organisations are connected through a financial resources computerised network system for the whole of the civil service, where the financial resources are managed and controlled. The budget for the great majority of Brazilian public institutions is then organised in that network system. Although the system allows for better control of the expenditures of the financial resources, it does not allow much flexibility for the organisation to make significant changes on the budget.

For several years, the institutions or universities of the Amazon region, like the rest of Brazil, have suffered from irregular governmental funding. Regarding the development of scientific activities, one of the main difficulties in the development of these scientific projects involving scientific co-operation between the Institute and other scientific institutions is their funding. In the development of research projects in collaboration, each side has to provide the necessary funds for the development of

the work. In the projects of scientific co-operation, the international organisations involved usually receive regular funding to develop their research projects. However, it is often the case that Brazilian funding is irregular which gives them a great disadvantage in relation to the foreign group and sometimes causes dependence on the foreign groups. With regular funding the foreign group in most cases have enough resources to carry on their projects, whereas the lack of regular funding often make it difficult to the Brazilian side to go further in their research.

Constant cuts and delays in the disbursement of the financial resources to develop the research projects generate a situation where the Brazilian side involved on the projects needs to look for funding from other different sources to develop their projects. In some cases, as sometimes happens in similar situations in research environments in other countries, several research projects would be submitted to different sources of funding. Occasionally, the same scientist would be 'formally' involved in several projects, which means that the researcher would be only nominally part of the project but would not have an actual participation in it. This situation occurs despite the fact that the Brazilian legislation defines as compulsory that for each research project carried out in the country involving foreign scientists there must be a participation by Brazilian scientists, as observed in the work of Velho (1995).

Thus, with that lack of funding from the Brazilian counterpart, the involvement and participation of Brazilian scientists in some projects does not seem to be as extensive as that of the foreign scientists, who would receive their funding regularly. This situation, often allows more participation of those foreign scientists in the projects resulting in inequitable outcomes in the scientific production and publication.

Conclusion

The aim of this chapter has been to present some introductory information about this research and to undertake a review of the important characteristics of INPA. The description included information about its creation, local and organisational features, management, human resources and scientific activities.

Some of the data presented shows that given the history, characteristics and structure of the Institute a process of improvement of its performance might be a great challenge to the organisation. It is always going to be difficult to make a government scientific institution, funded and administered on traditional and lines, into the vehicle for an international scientific enterprise. The next chapter analyses a body of theory – on quality improvement – that might aid the transformation and has been used in the Institute's case.

Chapter 2– The Literature of Quality Improvement

Introduction

This chapter develops a review of quality improvement programmes as well as considering the literature about quality and excellence in private and in public organisations. It gives information on quality management methodologies and analyses issues concerning the utilisation of the approaches in the public sector, and it also includes a discussion of issues related to administrative practices in developing countries.

In order to develop this study of a governmental scientific institution in a developing country of South America – Brazil – I found it useful to look at a theoretical framework which discusses the factors involved in a quality improvement programme undertaking in developing countries. As such the main purpose of this chapter is to explore conceptualisations of quality and excellence, and to consider the improvement process at INPA in the light of issues related to the public sector and developing countries.

New techniques for improvement of organisational performance have been studied both in the private and the public sector. As well as the demands for better quality of products from the private sector, the demands for a better quality of services delivered by the public sector have also been greater in the 90's than it was in the past decades (Carr and Littman, 1993). Amongst the concerns for delivering good services, there has also been a desire to pay attention to the demands of the customers of those services. As a result of these demands there is now a greater number of initiatives for improving the quality of the services provided by organisations in the public sphere. The initiatives for improvement of the services provided by public organisations may take several forms. Some of these initiatives involve the utilisation of different managerial approaches. A number of these managerial approaches involve initiatives for quality improvement. One of the

initiatives used in those improvement processes has been the quality management approach. One of those quality approaches, the Total Quality Management has been a system widely researched in the study of private organisations (Basadur and Robinson, 1993; Hackman and Wagerman, 1995) and its study in the public sector has largely taken place in the 90's (Rago, 1996; Swiss, 1992; Ehrenberg, 1992; Rees, 1992; Walsh, 1991; Berman, 1995). However, public sector experience with quality management has not been as systematically documented as private sector cases (French, 1994), even though more research on this subject has constantly been demanded because of public interest in the improvement of services supplied by the public sector.

Scientists, consultants and practitioners in different areas of private organisations have always sought to improve organisational performance, and for this reason, management through quality has been widely studied. Products or services of better quality with equal or less cost are generally the aim of continuous development initiatives. Nowadays managers sometimes may face many constraints which generate a need to learn different ways to improve work processes with the same or less financial resources. Furthermore public organisations are generally characterised as giant bureaucratic systems. Those entities usually contain huge hierarchies, rigid regulations and procedures which constrain their actions, giving little flexibility to them to perform well and hindering them in making better use of their human resources as well as their financial and technological ones. Therefore alternative ways for organising work, using scarce resources, producing more and with better quality need to be studied (Cohen, Brand, 1990).

This study analyses a Brazilian research institute located in the public sector. In order to develop an organisational analysis it is relevant to analyse the environment in which organisations are situated. As an organisation which is embedded in the bureaucracy of the governmental structure and culture of that country, it is essential to relate the western Quality Management literature to the understanding of administrative practices in developing countries and especially to the real-world situation found in Brazil. The Theory of Prismatic Society, developed by Fred W. Riggs and the presence of formalism, is going to be used in order to further the analysis of some of the public administrative practices in that specific environment.

Formalism is, broadly speaking, where the theoretical framework is satisfactory, but the practice on the ground remains deficient.

An Introductory Note on the quality improvement approach in the present context

As we have seen, one of the aims of the Science Centers project is to transform two scientific organisations located in the Brazilian Amazon region into centres of excellence in research in the Amazon region. But it is important to note that INPA and MPEG are not intended to improve through competition, although many quality management theories advocate competition as a means of improvement.

Although the Total Quality Management approach has not been the explicit theory used in the programme designed for the institutional improvement at the Institute, the excellence initiative may be associated with it. The process to transform INPA into a centre of excellence is characterised as a process to improve the quality of the organisation. The key word 'Excellence' is used constantly along the project, its related publications and World Bank documentation. It has been a word used both in the excellence improvement initiative as well as in managerial literature, such Peters and Waterman's book *In Search of Excellence* (Peters and Waterman, 1982). As excellence is such a central concept the excellence ideology is going to be analysed in that specific institutional context as well as in the related literature.

Quality improvement programmes are often designed to improve the quality (and excellence in this specific case) of the performance of organisations, study mechanisms that make them achieve their goals, find strategies that would make them more efficient, or, in other words, make them fit for its purposes. As such the improvement process at the Institute can be characterised as a quality improvement initiative even though its improvement programme is not designed in terms of a recognised quality management approach.

Other studies have been developed analysing quality improvement initiatives where institutions do not follow a formal quality programme. One of the Brazilian organisations investigated in the work of Vieira (1996), who carried out a comparative study on Brazilian and Scottish prison services, does not follow a formal

quality management programme. The author observes that "specialised literatures both on quality management and organisation studies do not contain much empirical information on quality practices in organisations which are not involved in formal quality management programs or which have a problematic definition of customers" (Vieira. 1996:6). He adds that it would be interesting to find out how quality is defined in organisations that are not involved in a formal quality management programme. Whilst not arguing that this is an exclusively Brazilian phenomenon – clearly organisations across the world attempt to improve without recourse to quality management programmes – there is a clear need to look at such issues in a Brazilian context. The movement of organisations becoming involved in Quality Management Programmes in order to compete for a quality certificate, for instance, has been a fad in the country. For that reason, such practices are widespread in Brazil.

The study of initiatives in more general 'excellence' approaches would add to the understanding of quality in organisations and particularly to a more general conceptualisation of quality and the terminology associated with it, compared with further studies of those limited to formal programmes. It would further assist in the study of the issue in organisations in different sectors of activity. As such, it seems relevant to carry out studies on organisations in a scientific setting which are not necessarily involved in a formal quality management programme. Therefore, the quality improvement initiative of INPA will be analysed using some key conceptual terminology of the Total Quality Management approach.

Quality Management and Excellence

Initiatives involving the utilisation of quality or excellence approaches have been studied considerably in business; however there have been very few investigations about the subject in public organisations, and little corroboration to assure the effectiveness of such initiatives. This is particularly the case with less "business-oriented" institutions, such as educational and scientific bodies. Thus, this study proposes to use a quality management approach as a theoretical background for the organisational analysis of the innovative process going on at the Institute. Further investigation may reveal whether such improvement programmes are suitable for the public sector, if any adaptation is necessary, and what the process of implementation

consists of. An understanding of both the new techniques of quality management and empirical studies using these theories as a framework in public organisations, can perhaps generate a response to these questions and can provide a useful contribution to studies about organisational practices.

An internationally-mandated improvement process of a research institute, subordinated to the government of Brazil, which is subjected to the constraints of the Brazilian civil service, with the specific characteristics of the Brazilian public administrative system generates interesting issues for analysis. INPA's strategic location in the Amazon region raises other important issues. These include, among others, the conservation of the natural environment, the need for a sustainable development of the region, the generation of scientific knowledge about the area, the strengthening of the research capabilities of institutions located in the region, and the involvement of international organisations in national politics in that specific context. These issues generate interesting topics for analysis and discussion, giving sound grounds for scientific investigation.

Even though the Institute is not following a formal programme using a quality management approach, questions which are important on quality improvement initiatives are going to be addressed, with particular reference to how the Institute is dealing with them. This present study thus proposes to analyse the quality improvement process at the Institute, to analyse issues connected to the excellence definition at that specific environment, as well as to the identification of relevant customers and their demands.

Quality Management Methodologies

Several approaches involving quality as a factor to enhance organisational effectiveness have been developed, including quality control, quality assurance, and quality circles, as well as quality management. Names like W. Edwards Deming, Joseph Juran, Philip B. Crosby and Kaoru Ishikawa are cited in the literature as "quality experts or gurus" and are linked to the quality movement.

One of the most frequently mentioned of these approaches is Total Quality Management (TQM), developed in the 1920's by W. Edwards Deming, who based

part of his work on the idea of using statistical control in manufacturing processes. The purpose of his study was to improve performance in this area. The approaches of quality management spread from manufacturing to other areas of industry, as well as to services. However, there is still relatively little existing research which has addressed the study of the application of this approach in the public sector.

In the 1950's the techniques of TQM were utilised in Japan after the Second World War in order to facilitate economic recovery (Swiss, 1992). Among other factors, the quality of Japanese products and their participation in the markets affected international business considerably. The successful results of the application of quality management techniques in the work processes of some Japanese companies became evident, resulting in a demand for studies of this phenomenon, its principles, techniques and applications.

Thus, around the beginning of the 80's, when the changes in the global economy and competition for markets started to affect business significantly, quality management techniques also began to be widely used in business practices in the USA.

An Approach to Quality

Although many approaches have been identified and have been related to the quality experts, sometimes referred to as gurus, in the quality management literature, those approaches usually involve the attention which should be given to customers, a continuous improvement process and the involvement of employees. Swiss (1992:357), for instance, suggests that the 14 points approach of Deming to TQM can be summed up in 7 tenets. According to him, quality, then:

1. Is determined by the customer. Customers are the first and most important element in a quality programme and they can be either internal or external. The internal ones are those who work in the same or in another organisational unit of the organisation and external are outside of it. Thus, it is very important to identify the organisation's customers, to know their needs and produce goods or services that satisfy their requirements.

2. Should be present at all stages of the production process. In quality management the inspection should not only be done at the end of the process, like the practices of quality control in which products are checked and defectives ones are disposed of. Inspections made at the early stages of the process are less costly.

3. Requires developing human resources. People are the organisation's greatest and most unique resource. The greatest opportunities for growth and advancement lie in the development of human resources by soliciting ideas, drawing on experiences, seeking creative involvement, and developing them in every aspect of the organisation.

4. Can be achieved from employees working in quality teams. The results of achievement can not be attributed to the efforts of individuals. Quality experts believe that employees working in teams can bring better results in performance. The concept of awards for individual performance is highly criticised in quality management for bringing competitiveness among workers.

5. "Requires strong worker participation". All of them should participate in the quality improvement process. This movement to quality depends a great deal on the participation of the employees working together with managers and in quality teams. It is important that front line workers think about their work and try to identify points which can be improved.

6. "Requires continuous improvement". A product or system in the organisation, according to quality system, can always be analysed and improved. This stage of identification and analysis of work processes should be done by employees working in cross-functional teams.

7. Needs commitment of all members of the organisation. Even with participation of all members it is clear that the top management must have the commitment to carry out a continuous quality improvement project in the organisation. The quality process should start from top to bottom in the organisation.

In a quality management programme, different techniques have been identified in the literature as "tools", which can be applied in this process of continuous improvement. Quality experts suggest several tools are necessary to measure

performance, identify and analyse points for improvement, evaluate solutions, register changes in a processes, and so on. These include statistical packages, Pareto analysis, cause-and-effect diagrams, flowcharts and brainstorming.

The Public Sector

The concepts of quality were first introduced in the manufacturing processes in order to improve the performance of organisations in this area. Nowadays these concepts have spread to other domains.

Although TQM terminology originally refers to products, several authors have now shown that the philosophy of quality management and its practices can also be applied to services (Cohen, Brand, 1990; Rago, 1994). Suarez (1992) for example, argues that services, like products, are the result of some process or group of processes that may be improved. This seems like a common-sense view, as it is difficult to argue that services somehow cannot ever be improved.

The analysis of the quality of services, as opposed to products, may involve values that can differ from one individual to another. Another interesting consideration made by Walsh, (1991:506), is that some kinds of services are "intangible and consequently cannot easily be ... sampled for testing ...". Accordingly, an application of quality system in public services will probably need to be adapted to suit its characteristics. Walsh (1991:507) also observes that:

> "services are more difficult to standardize than manufactured goods, which can be controlled through the various techniques of production engineering and scientific management"

Although the author makes interesting observations which can be related to public sector, some of his analyses are more applied to the delivery of services, which involves a closer interaction between the provider and the customer, such as in a doctor-patient relationship. In such cases, where there is no tangible measure of the quality of a service, customer satisfaction is the only way of telling whether a high quality service is provided.

Several authors place stress on customer satisfaction in TQM philosophy. Hackman and Wageman (1995:312) observes that "to achieve quality, it is essential to know what customers want, and to provide products or services that meet their requirements" (quoting Ishikawa, 1985). Others go much further; for example Wilkinson, *et al* (1997:800) states that "quality means meeting customer requirements and the orientation of quality is to satisfy customers". Such a statement appears to be too strong. Although customer's requirements are very important, many services can have their quality tested in objective ways.

This customer orientation involves several aspects which must be considered in a quality improvement process, such as the identification of the customers, and ways of satisfying their requirements.

Quality philosophy suggests that customers may be internal or external to the organisation. Internal customers can be, for example, other employees of the same organisation. Carr and Littman (1993:28) define an internal customer as:

> "another unit or person in your organization whose part in a work process comes after yours or who uses your output to do his or her job"

The authors argue that the idea of quality and the importance of customers can be more clearly understandable in business. Products are not bought if customers are not satisfied with the products or services, and accordingly there will be a reflection on profits which will certainly be felt.

However, in the public sector, as opposed to the business case, the identification of external customers itself, may be a troublesome issue. Swiss (1992:358) states that:

> "in business, the company can usually choose its own market niche, and thus define its target customers: luxury car buyers, for example, or price-conscious food purchasers. For many public agencies, on the other hand, defining the customer is a difficult and politically controversial issue ... Because government agencies must serve a wide variety of customers who have widely divergent and even contradictory demands, and because the general public remains a 'hidden customer' with yet additional, often incompatible demands, government agencies often have to deliver a service or product that reflects an uneasy compromise. In such cases, the principle of

> delighting or even satisfying customers begs too many questions to be a clear or useful goal."

On the other hand, Rago (1994:61) argues that:

> "In reality, however, government organisations are probably not much different from any other type of business in that their organisational structures possess many different departments, divisions, and offices all of which have a somewhat specific function. Each department works with a sub-set of the organisation's customers, and the expectations of these customers can be quite unambiguous."

Swiss tell us that customer satisfaction cannot be used as a measure of quality. The real lesson of his work, is that there is a need to state which customers one wishes to satisfy. In a situation with several, conflicting potential goals, it is necessary to prioritise and having done that, there is no reason why customer satisfaction cannot be a useful indicator of quality.

Rago (1994) seems to base his analysis of the subject on offering a more fragmented idea of the approach needed to identify the customers of an organisation. However this seems to offer a more manageable way of achieving a practical customer identification, and a more realistic view of the public sector. Although there are significant differences between the public and the private sectors and there are additional barriers in using Total Quality Management in the public sector, governmental organisations are not so different that quality management approaches are unhelpful.

Quality Evaluation Exercises

Another issue raised when transporting quality management approaches from the private to the public sector is that of evaluating the improvement process. Private organisations world-wide adopt different kinds of evaluation for the quality improvement in their business.

Those kinds of initiatives sometimes involve the evaluation of the quality of the service provided with the aim to compete for quality certificates. Those practices

involve different kind of instruments which can be used in such quality evaluations. In Brazil, service quality surveys have also had widespread use in private organisations in different areas of business, and in the provision of services, such as, for instance, hospitals and postal services. However, the use of such evaluations in public organisations has been very rare. There is no evidence that this kind of exercise related to the evaluation of quality has ever been used in any scientific institution in Brazil.

In spite of the widespread use of such quality evaluations, to seek quality certificates, a movement which has happened in private organisations world wide, this does not seem to be the kind of exercise that is going to take place at the Institute, as part of the improvement process. The earlier section "An introductory note on the quality improvement approach in the present context" provides the basis for the improvement of the quality of the Institute. It is important to be clear that the term excellence as referred to in this study and used in the denomination 'Centre of Excellence' does not imply in any competition for a quality certificate nor it is characterised as an official status. The completion of the Excellence Programme will not necessarily result in increased funding or assistance from the Brazilian Government or international organisations. Instead, it seems to be rather a continual process of improving the quality of the institution. It is then possible that increased resources will become available due to the greater efficiency of the Institute. However, there is no parallel effort, alongside the improvement process, to achieve any recognised standard of quality management.

We should be clear however that the absence of effort to obtain internationally recognised standards does not mean that scientific organisations in Brazil are not involved in quality evaluation. For example, the research produced at such institutions is already evaluated as a means of deciding future allocations of funds. It must be made explicitly clear that the absence of a programme to obtain a certificate does not imply that there is no attempt to improve quality, or that such an attempt is doomed to failure.

The reasons for not pursuing an internationally recognised measurement of quality may be complex. One such reason would be that, for a certificate to be gained, all the

Institute's activities may be looked at, while the Excellence Programme is only concerned with improving the level of research. It may also increase the costs of the Institute, if it were to meet the requirements for such a certificate, without a corresponding improvement in services.

There is no clear consensus in the literature on which quality management approaches were the most successful. Different successful companies use several different approaches. Morgan and Potter (1995) observe that the quality terminology is used in different approaches, being one of them the managerial or excellence approach which will be discussed on the next section.

An Excellence Perspective

In the early 80's a movement related to excellence began, following the publication of a book by Thomas J. Peters and Robert H. Waterman entitled *In Search of Excellence: Lessons from America's Best-run Companies* (Peters and Waterman, 1982).

One of the main features in the work by Peters and Waterman is their search for excellence in the organisations studied. Although their work, as was pointed out earlier, is concentrated mainly on American manufacturing companies, it is a useful starting point to discuss the concept of excellence. The analysis of the managerial concept of excellence provides the connection between Peters and Waterman's seminal work and the present research.

As the title of the book suggests, the authors searched among several successful companies in the industrial sector of the United States for the characteristics which made them excellent in their field. The initial sample of the study involved the analysis of sixty-two companies which were grouped into six categories. Among those categories included, twenty-four of those companies were classified as 'high technology' and seventeen were classified as 'customer goods'. The 'general industry' category included seven organisations, while seven companies were included in the 'service' category. Three companies were classified under the 'project management' category and finally five others were classified as 'resource-based' companies. The companies in the study included well-known names such as

McDonald's, Disney Productions, Boeing and General Motors. Some of the companies were considered very successful at the time of the research in the early 80's, and many of them are still doing well in business today. Other companies, which nowadays may be considered as performing well, such as Microsoft, are not included in Peters and Waterman's study, while others included in sample no longer seem to be in the top rank of successful companies today.

The companies included in the research sample were generally large and had mostly been in their business for at least twenty years. Few of the companies had average annual sales of less than one billion dollars. In order to select the companies to be included in the final sample, the authors defined six measures of long-term superiority. Three of those measures were related to growth and long-term wealth creation over a twenty-year period, and three other measures were related to return on capital and sales (Peters and Waterman, 1982).

The measures specified in the book were mainly related to business growth and economic health. Consequently, in order to be included on the sample, the companies had to be classified as being in the top half of their industries and had to have scored well in at least four out of the six measures over the specified period of twenty years which was analysed. Another indicator of performance used in the study was related to the concept of innovation, which Peters and Waterman (1982:23) define as "a continuous flow of industry bellwether products and services and general speed of response to changing markets or other external dynamics".

After the analyses of these criteria, not all of the sixty-two companies initially selected were classified as being suitable for the study, and only forty-three of them remained to be investigated. In addition to the analysis of the organisations, interviews were conducted with people in different post and at different levels at the companies.

The results of the study on the features that made those companies excellent in their business suggested that the companies investigated showed some similar characteristics which were common to most of their business practices.

A characteristic noticed in most of the excellent companies investigated was an action-orientated attitude. This attribute was related to the ability to get things done. In order to achieve an action-orientated atmosphere, the authors stressed that the mechanisms used by the companies were many and varied. This feature was also related to an organisational fluidity that such firms often experienced, as well as an informal and open system of communication. They pointed out that rich informal communication led to more action, more experimentation, more learning, greater simplification of systems and an ability to remain close to the outside environment.

A marked emphasis on autonomy, which created a strong decentralisation in the other units connected to them, was also a feature common to the companies studied. The autonomy referred not only to the organisation and their organisational units as a whole, but also to individuals and groups within them, and encouraged an action-orientated atmosphere.

The autonomy and the action orientated features explained above could be more easily applied in private companies, and seem to have limitations as to how well they could be transported to the public sector. The hierarchical and bureaucratic system of public organisations limits the scope for civil servants to be more autonomous. Public actions often involve a series of bureaucratic procedures which inhibit a more efficient performance. Managers in the public sector are part of a chain of command which makes it more difficult for them to exercise real autonomy. Being a public organisation of the Brazilian government the Institute has also been constrained by limitations for a more autonomous management. Recently, a change in the legal status of the Institute which would give it more autonomy was proposed but it was not approved. This issue will be discussed in a later section in this thesis.

Other common characteristics found in the companies included in the study involve a strong emphasis on: finding mechanisms to get closer to the customer; to being highly service-orientated, irrespective of the kind of business they are in; and to having an obsession for quality, for getting close to their customers and for listening to their users. Several examples are given of the ways which they use to listen to customers, identifying requirements and attending to their demands.

The customer is also emphasised in the Peters and Waterman study as is the case in strategies which are stressed in other quality management programmes. The quality management literature on the public sector also suggests that public organisations should also adopt a customer-orientated approach. Later in this chapter, there will be more discussion on the issue of the customer in public organisations.

A strong staff orientation was a characteristic frequently found in the companies classified as being excellent. Peters and Waterman observed that there was hardly a more pervasive theme than that of respect for the individual. Although they have different systems of incentives and performance appraisal the marked people-orientation of the excellent companies was a characteristic found in the majority of them.

Given the characteristics of the public sector, incentives and the system of staff appraisal often cannot be implemented as easily as it can in the private sector. Public organisations are often subject to a built-in bureaucracy which makes it more difficult to make changes to the personnel system. An account of some of the characteristics of the organisation and the peculiarities in the personnel system can be seen in the discussion about the organisation on which this study is focused, as well as in the chapter which discusses the data collected during the fieldwork.

Another problem with applying the concept of excellence to the public sector is the lack of clear "market leaders" according to Peters and Waterman's criteria. This comes about for several reasons. It is much more difficult to quantify the success of a public sector organisation, and the criteria for success are different for the public and private sectors. This makes it difficult to apply much of Peters and Waterman's work directly to the public sector – however it may be more applicable to a scientific setting given the characteristics of such organisations. Scientific organisations may have more defined customers, the services delivered by them may be more easily customer orientated, the need for efficiency in order to compete for research funding with other similar organisations is clearer, and so forth.

Another attribute discussed in the Peters and Waterman work is related to the presence and importance of value systems in the excellent companies. They consider the extent to which it is possible to be an excellent company without clarity of values

and without having the right kind of values. They observe that, despite the distinctiveness of the values of the excellent companies, they find among them a few common characteristics that unify them. Those characteristics are that values are almost always stated in qualitative, rather than quantitative terms; an effort is made to inspire the people at the very bottom of the organisation; and that the values are closely linked to the beliefs of the members of the organisation.

One attribute is related to the culture of the organisation. The performance of an organisation, it is argued, reflects the culture of that organisation, and it can be analysed to see whether an organisation is located in closely private or in the public sector. This suggests that organisational culture is highly connected to the environment in which it is involved. It is one factor analysed in scientific studies and it is will be discussed later in this chapter.

The authors also observe that the "odds for excellent performance seem strongly to favour those companies that stay reasonably close to businesses they know" (Peters and Waterman, 1982:15). This observation is backed up by evidence from other studies, and the authors observe that those studies suggest that companies which stick to the business that they know are more likely to perform well than those which opt to diversify in their business.

An organisation may often become involved in activities which are not closely connected to its original goals. Diversification from the original activities of an organisation may sometimes produce changes and direct it away from its main objectives. This truth of this observation may also be found in the activities of public organisations. A clear example of this will be observed later in this study, along with the perceptions of participants and analysis on its implications for the Institute analysed in this research.

One of the characteristics observed in most of the excellent companies is that they tend to have a simple organisational structure. This basic type of structural arrangement seems to encourage organisational flexibility. In addition to a basic organisational structure the companies also seems to make better use of task forces, project centres, and other devices which facilitate the development of their work.

The ability to make changes in public organisations and in their organisational structure may involve more complex procedures and that may make it difficult for them to be effected. This may also be true for private companies, although they are often able to structure themselves more simply, which often gives them greater flexibility to enable them to perform better. Public organisations are linked, and subordinate, to other organisations in a hierarchical structure. This structure is often highly bureaucratic and makes it very to promote desirable organisational changes.

As can be seen, the characteristics which make private companies successful have only limited applicability in public sector organisations. The particular characteristics of public organisations often make it difficult to apply some of the features which are more easily implemented in a private organisation.

In order to illustrate those attributes, and in an attempt to explain and expose their ideas and findings, Peters and Waterman describe the different situations which sometimes are involved in the day-to-day running of those organisations. For the development of their ideas they concentrate not only on illustrating the histories of the companies researched in their study, but also make use of other companies which were not involved in their research. However, in the combination of the case studies of the organisations and the construction of the theoretical rationale behind the authors' findings and ideas, it can be seen that, despite the attempt of the authors, it is extremely difficult to identify what really makes any company excellent in their area of operation. The theoretical rationale and the understanding of the concepts related to the subject being studied are not clearly explained in the book, which makes it difficult to grasp the scientific findings of that study. Another missing feature was a conclusion section to the book. Each attribute is described in a different chapter and the last chapter - Simultaneous Loose-Tight Properties attribute - is the end of the book and also provides a summary of the seven features presented during the book.

Given the focus of the analyses of Peters and Waterman on private companies, not all the indicators used in their analyses of successful companies can be employed in the analyses of public organisations (such as those measures related to growth, long-term wealth, and the return on capital and sales). In most cases, the main goal of

public organisations is to provide a service to the public, whereas for private companies making a profit is, most frequently, their main goal. However some of the attributes listed above can be related to public organisations and may be relevant for the analysis of those specific environments. One of the interesting points of Peters and Waterman's work is the emphasis on the fact that successful companies must have an outward looking approach. The emphasis on the customers' perspective is an attribute that can also be related easily to the managerial approach of quality improvement programmes. Peters and Waterman's book is one of the earliest works to analyse excellence as a theoretical concept and one of the most commented and important references on the discussion of that subject.

The search for excellence study developed by Peters and Waterman concentrated on private sector companies engaged on business mainly in the industrial area of the United States. Thomas Peters later developed another study on the same theme in conjunction with a different author. It is the book by Tom Peters and Nancy Austin *A Passion for Excellence* (1985) and it also analyses American companies. The book is divided into five parts and also gives emphasis to Customers, Innovation, People, and Leadership. Those main themes of the book are then explored in twenty-one chapters.

Although none of the organisations included in the Peters and Waterman study was part of the public sector, and the work of Peters and Austin includes only a few organisations in the public sector, some of the literature that followed built upon these, analyses the concept of excellence in the public sector. In a computing search through the Internet, five hundred and forty five titles of material related to Excellence and Government were found. Among those there is an American Council for Excellence in Government (http:www.excelgov.org/). In addition that electronic address gives information about a material published in the form of a video tape where Tom Peters gives examples of success in government and non-profit organisations.

Another illustration of a work utilising the same excellence concept as a theoretical framework in a public context is the work by Carr and Litman described in their book *Excellence in Government* (Carr and Litman, 1993). In that book, Carr and

Litman discuss the utilisation of quality management approaches, with emphasis on Total Quality Management, in government. The work analyses USA governmental agencies, presents an enthusiastic view about quality management philosophy, provides examples of the utilisation of the methodology in several US public sector organisations and tries to promote its application in government. The work cannot be characterised as an academic treatise but rather is mainly directed at people who work in governmental agencies, including governmental officials, top administrators, middle managers and employees. The authors argue that TQM is a management philosophy which can be used to achieve excellence in government. They add that "the TQM organisation is dynamic, using strategic planning to align itself with the future. It is flexible, in order to respond to changes in demand and environment. In short, it is ideally suited for success in a world where the only constant is change" (Carr and Litman, 1993:3).

The authors state four reasons why governments need TQM:

- Citizens are not satisfied with the quality of government services
- Tight budgets and deficits
- Competition for labour force
- Survival

As such, although the material presents some brief information on some characteristics of traditional management and the history of TQM, it describes some of the principles of the methodology without the critical analysis characteristic of the quality management approach. But it is a further example of how the concept of excellence plays an important part in the literature on quality management. In Chapter 5 of this thesis, matters related to the definition of excellence will be discussed as will other issues coming largely from the information collected by interview during the fieldwork stage.

The Definition of Quality

There seems to be no agreement in the academic literature on the definition of the concepts of quality or excellence and whether they are part of a philosophy of management, an approach, a set of techniques, or a system. Quality management

approaches also usually involve a set of techniques and a specific programme which can be used to implement quality management programmes in organisations. Several approaches and techniques for organisational improvement can be identified and connected to the quality movement. Accordingly, the quality management movement does not involve only a single definite programme to be followed or specific techniques which should always be used in the implementation of improvement initiatives.

In addition, it is hard to precisely define quality or excellence. It has been argued that quality can not be defined in one single word, and may rely on the customers' subjective judgements of the level of quality of any particular product or service. According to this ideology an organisation's customers should decide what they really want and in turn the company must respond to meet their requirements. Further observations on the subject will be presented in Chapter 5, where I will discuss the issue of the customer in the institutional context.

For Deming, quality is essential for business survival. Hill (1995) however has defined TQM as a business discipline and philosophy of management. Another meaning of quality may be defined, in short, as "fitness for use", in other words a product or service should do what is needed or wanted by the customer (Shuler and Harris, 1992:21). They also stress that a product must be designed to meet the customers' needs and that it has to be free of deficiencies. Carr and Littman (1993:3) observe that:

> "in TQM, quality means everything of value to a public service organisation and its customers (the end users of products and services). This includes the physical quality of the products and services, productivity, efficiency, ethics, morale, safety, and wise use of resources"

According to that definition, the view of the customers about a certain product or service are also the determinants of the quality. The European Organization for Quality Control (EOQC) and the American Society for Quality Control (quoted by Morgan and Murgatroyd, 1994:8) definition of quality is:

> "the totality of features of a product or service that bears on its ability to satisfy given needs"

Morgan and Murgatroyd (1994:8) observe that that "is essentially a transcendental view of quality, implying a sense of excellence – something which, in its completeness, is more felt than measured. It does not, however, convey what the determinants of the excellence are". It is interesting to note the mixing between the excellence and quality words.

In addition, the authors point out that, in manufacturing, quality is often related to the conformity of a product to its specification whereas in the service industries the concept of quality is more closely related to the idea of customer care. As such, bearing in mind the distinction between the quality of products and the quality of services, Morgan and Murgatroyd (1994:10), like other authors (Parasuraman et al., 1985), point out that quality in the service sector has specific features that distinguish it from quality in the industrial sector. The characteristics of quality found in the services are related to intangibility, heterogeneity and inscparability. Intangibility refers to the fact that services are performed rather than manufactured and, as such, most cannot be measured, counted, tested or verified. Heterogeneity refers to the different needs that customers might have. As the authors point out "different consumers of the same services do not all have the same priorities" (Morgan and Murgatroyd, 1994:10). And finally, services are seen as inseparable because it is generally impossible to separate the production and consumption of services in the same way as they can be separated in manufacturing industry. In service industries, the authors observe that frequently "quality occurs during the delivery of the service, usually during the interaction between the client and the key contact person from the service provider. In these situations, the consumer's input becomes critical to the quality of service performance" (Morgan and Murgatroyd, 1994:10).

Customers Identification and Satisfaction

As has been demonstrated, the literature on quality often emphasises that quality is closely related to customer requirements and satisfaction (Rees, 1992; Wagenheim and Reurink, 1991; Madu, Kuei and Winokur, 1995; Bonser, 1992). The identification of the customers of private enterprises may be easier than the identification of those from public organisations. Private companies usually have

specific methods for marketing or for testing its products and for identifying customers for the specific products they design and manufacture. For example, manufactures of expensive cars can relatively easily identify those positioned at the top of the social hierarchy as their likely customers. This makes it easier to identify their needs. It is different in public sector organisations. The needs of customers are not always straightforward. Morgan and Murgatroyd (1994:10) provide interesting examples of that when they observe that:

> "within a classroom in a school, the particular learning needs of individual students will be different – some will be more numerate or literate than others, and some will have different ambitions for applying the particular knowledge being taught to them. Similarly, in the health sector, some patients crave their own room on hospitalization, whereas others do not want to be on their own"

However, before the needs of customers can be satisfied, a public sector organisation has to be able to identify just who its customers are. This is not always obvious. In a scientific institution, for instance, customers will include the different beneficiaries of the services provided – those who use the scientific outputs, the agencies which fund the institution, national and regional governments.

Although it can be argued that the customers of a scientific institution can be clearly defined, this view does not necessarily stand up to criticism. It is unclear to what degree the Government, other institutions, the private sector, local producers or the local population as a whole should be considered as customers, and of these groups, whose interests are most important.

The awareness of the need to identify the customer, to satisfy their demands and to develop an approach in which customer care is paramount, is sometimes not present in this type of organisation. Later in this study I will return to the issue of customer identification and the identification of demands on the Institute.

In a research institution a customer care approach could perhaps provide closer relationships with their customers, help to identify their specific demands which would in turn help the organisation to define its objectives, set its research priorities, and identify appropriate research topics.

Although other customers may also be identified who benefit from the delivery of the services of the scientific institutions, those who provide the funding of the organisation are probably one of the most important customers who need to be considered. The funding agencies, along with central and local government, must be seen as key customers of any public research organisation. As the literature on quality suggests, the quality of an organisation can be measured by the extent to which it satisfies its customers' requirements and meets their expectations. If this is true, it is essential that the organisation consider the views of its important customers.

Having identified their customers, organisations must also meet their requirements. Carr and Litmann (1993:9), in their book Excellence in Government, state that "citizens are your ultimate customers, the final beneficiaries of your products and services" and that "your customer in government is anyone who receives or uses what you produce - or whose success or satisfaction depends on your actions" (Carr and Litmann, 1993:28). This presents such organisations with a significant challenge in identifying all relevant customers. In addition, given the wide range of customers for such organisations, they will have different and perhaps conflicting needs.

The range of customers, their differing requirements and the other demands made on organisations such as the research institute used in this study may mean that they are subject, not only to scientific pressures, but also to others which are political or economic. An example of the type of political issue to which such an institute might be subject would be the demand that it produce technologies that might be desirable as part of the development policy for the region in which it is located.

In economic terms, the Brazilian Institute would probably be inclined to develop studies that would involve the use of natural resources efficiently and rationally but simultaneously to do so in a way that was compatible with the notion of sustainable. Projects would have to consider not only the benefit of the present local population but also that of future generations. One of the big social problems in the region in which the institute is located is the lack of investment from both private enterprise and government in the countryside. This results in considerable migration of the population, in search of a better life, to the big cities. Often, the quality of life of

those who move deteriorates because of the lack of employment and the poor living conditions to which they are subject.

It must be recognised that this situation cannot be easily resolved and any effort to do so would involve several players. However, it can also be said that the Institute has an important social and economic role to play. It employs a number of qualified workers who must be considered to be part of the elite in a country like Brazil, given the great inequality and poverty, and the generally low level of education of most of the population. Thus, an important contribution which the Institute can make is to apply the results of research projects for the economic benefit of the region. This way, scientific activity also starts to play an important social role in society as it studies and looks for solutions which may alleviate poverty and improve the quality of life of the people of the region.

In addition, to adopt a more customer-orientated approach would not necessarily result in the Institute being unable to work on less applied or basic research i.e. research which does not have an immediate application. Undertaking a greater amount of more applied research does not deny the importance of basic research and in some cases it is important to undertake it. Only then it might be possible to see just how the results could be used in a more applied way. However, in an increasingly demanding economic environment, funding from government for scientific institutions is likely to become targeted on the most efficient institutions. In addition, it also seems essential that scientific institutions try to develop ways in which they can become less dependent on public funding. Public scientific institutions need to become ever more aware of the competition for funding and must understand that in a competitive environment well structured and efficient organisations are more likely to succeed. Public institutions nowadays need to find ways to strengthen their performance and give them greater flexibility to respond to the demands upon them, bearing in mind their need for survival in an increasingly competitive environment. All of this puts increased pressure on scientific institutions to undertake more applied research, and management theory about customer satisfaction does not provide much help in resolving these demands.

Some Aspects of the Administrative Practices in Developing Countries

In addition to the difficulties in dealing with the idiosyncrasies of public administration, the common belief is that developing countries have additional management problems, which have to be considered when they are the subject of scientific investigation, a view support by several authors (Vieira, 1996; Oliveira, 1998; Casate, 1990).

An important contribution to the understanding of administrative practices around the world, and especially in developing countries, was the study done by Fred W. Riggs in his book *Administration in Developing Countries – The Theory of Prismatic Society* (1964). Studying administrative practices, Riggs observed some characteristics that are present in several developing countries.

In the 60's, in the USA, Riggs developed the Theory of Prismatic Society. In his book, the author's primary intention was to analyse the structure and identify problems of public administration in developing countries.

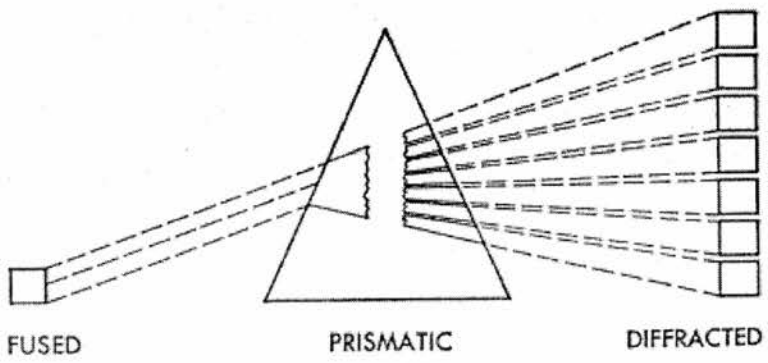
His book *Administration in Developing Countries*, where the Theory of Prismatic Societies fully developed, is mainly based on his previous works in the Philippines, where he stayed for two years (1958-59) as visiting professor. He observes that although the time spent in Philippines was essential for the formulation of the "prismatic model", the foundations of the publication were laid the year before in Thailand. The author also uses examples of administrative practices from other countries such as India, China, Cuba, Mexico, Colombia and Guatemala and makes comparisons with more developed countries like the United States.

In his work the author observes that similar management problems are commonly found in third world countries. Riggs argues that an important characteristic observed in the practices of public administration in developing countries is the presence of *formalism*. Formalism, according to him, can be defined primarily as the divergence between the formal and the effective, between theory and practice, between the law and its implementation.

To demonstrate his theory and explain this 'prismatic' concept, the author elaborated a model and developed an analogy with the refraction of a white light which

becomes diffracted when passing through a prism. He uses the terms Fused, Prismatic and Diffracted in the construction of the model. These are terms widely used in physics. The term 'fused' refers to the white colour while the term 'diffracted' refers to the transformation of the white colour when, after passing through a prism, the white light breaks down into several colours like a rainbow spectrum. The prismatic concept is then associated with that intermediate stage between the light before and after its transformation through the prism. The stage of administrative development of developing country are often in a intermediate stage, where not all sectors of the society perform the primary functions for which they were created, a phenomenon which is susceptible for the presence of the formalism. In these transitional societies it is more like to have a great divergence between the formal prescribed rules and the actual behaviour. A demonstration of his theory can be seen in Figure 2.

Figure 2 - Demonstration of Riggs model.



Riggs (1964:4) observes that "it is becoming popular to refer to the countries seeking to speed up their own industrialization as "transitional societies". However, he observes that the passage from one stage to another, and in this case from formal rules to their implementation, usually involves time, because the transformation process may differ from one society to another. Riggs (1964:ix) mentions that:

> "on further reflection I concluded that every society is more or less prismatic, that the number of cases diminishes rather than increases as one approaches either the fused or diffracted extremes"

Ramos makes an important contribution to the understanding of the theoretical propositions of Riggs in his book *Administração e Contexto Brasileiro* (1983) (Administration and the Brazilian Context). The author explores further the work of Riggs and reviews the comments of other Brazilian authors on the administrative theory developed by Riggs. Ramos (1983), analysing Riggs work, observes that formalism is also a characteristic which can be observed in all societies. However, it is more dominant in prismatic societies and marginal in the fused and diffracted societies.

It is therefore useful to know how Brazil fits into this framework. According to a recent Economist article (The Economist, 1999), Brazil is described as:

> "a hard place to classify. Overall, it is a middle-income country, with a GDP per head of around $4,800 (or $6,500 in terms of purchasing-power parity)"

However, it is also a country of extremes, with wide variations of wealth both across different regions and within the same region. While the Amazon region is substantially poorer than Brazil as a whole, Manaus is a relatively prosperous part of the region, and the scientific employees of the Institute tend to be fairly well educated.

According to Riggs' theory, transitional societies can typically be characterised by "a mixture of the traditional and the modern" that is "the new and the old exist side by side in a heterogeneous mixture" (Riggs, 1964:14). Riggs defines this process as *heterogeneity*. He observes that the characteristic of heterogeneity observed in developing societies can be interpreted as a heterogeneous social system.

In developing societies, technologies prevalent in more advanced countries, such as managerial techniques, are often imported to be used in different organisational settings in the emerging countries. In the highly competitive world in which we live, the importation of such technologies are believed to be what is needed to ensure business survival. Such technologies are applied not only in private enterprises but also in public organisations. However, the implementation of imported technologies in different environments do not necessarily produce similar results.

Another point considered in Riggs' analysis is the set of functions performed by different groups in society. Organisations, family and school for instance should perform their respective functions in a more developed society, performing the proper tasks for which they were founded. In this context "administrative bureau are considered to have a single function: to implement laws" (Riggs, 1964:13). On the other hand, in transitional societies the functions of these groups are sometimes mixed up, resulting in what he defines as *overlapping*. The phenomenon of overlapping and heterogeneity, defined above, is commonly observed in transitional societies.

Another example of overlapping is the influence of different sectors of the society on the development of activities of organisations. In a public context a high degree of political interference in administrative matters can sometimes be observed. Their influence may be felt to a greater or lesser extent in different activities, such as in the development of scientific research activities. The influence of politicians on the appointment, and even on the work, of top administrators is an example of such interference. The impact of this kind of interference, involving the appointment of a new director for the Institute, will be described later in this study.

Furthermore, Riggs assumes that the implementation of rules in transitional societies is a complex task because they may not make the desirable changes. He argues that "the more formalistic an administrative situation is to start with, the less effect on behaviour a change in the prescribed norms will have" (Riggs, 1964:16). The author (Riggs, 1964:18) continues arguing that:

> "in societies where formal economic and administrative models provide relatively accurate images of reality, it is practical to study the models, including, on the administrative side, laws and regulations, since these provide good evidence of practice, and changes in them are followed by corresponding changes in practice"

On the other hand, in transitional societies:

> "where the formal models are far removed from reality, such study of legal and administrative models becomes increasingly 'legalistic'; that is, it

> provides a less and less accurate picture of reality and an increasingly ineffective technique for changing it"

The cultural values of individuals in organisations, according to this theory, is a significant variable that should be analysed in these kinds of studies because it plays an important role in an organisation's performance. Different from other government organisations, scientific institutions are involved in activities which are specific to scientific settings. An example of this is the need to provide outputs such as publications both at the scientific level and in a more accessible format for customers with non-scientific backgrounds. In these kinds of environment there is often many people, from different places and backgrounds and with different levels of qualification, involved in scientific research projects. These are peculiar characteristics of the Institute not usually found in other kinds of public organisations. The human resources development programme of such institutions is expected to provide the resources to train their staff to a high level of competence. Such peculiarities make these kinds of institutions and, more specifically, the studied Institute atypical governmental organisations.

The analysis of the culture of an organisation is an aspect also emphasised by scientists such as Souza (1991) and Casate (1990), who used the same theoretical basis, i.e. the Theory of Prismatic Societies, in their studies.

Scientists who have made use of other administrative theories have often identified the importance of studying cultural factors to help understand administrative systems. For example, Guimarães (1991) in his book *Ecopolitics of Development in the Third World* develops a study as part of a case study of a government agency responsible for environment protection in Brazil. Guimarães develops an extensive historical and political analysis of the development of environmental concerns in Brazil, as well as an institutional analysis of SEMA – *Secretaria Especial do Meio Ambiente* (Special Secretariat of the Environment) a specialised environmental governmental agency. Developing a historical analysis of environmental management in the context of the Brazilian political development, Guimarães (1991) provides a detailed study of the bureaucratic politics of public policies in the area of environment. He analyses how the environment is conceptualised in development planning, as well as how environmental management reflects the main features of the

political system and of the social formation of Brazil. Guimarães (1991:16) observes that:

> "the culture of an organisation is understood as the combination of its values, missions, routines, capabilities, and action. These are not determined by any analytical order imposed by the observer ... instead, one studies these values, missions, routines, capabilities, and actions as they are defined and perceived by the members of the organisation".

Therefore, there seems to be widespread agreement that the cultural factor can affect the performance of organisations, especially those located in the public sector. However it is necessary to understand precisely what these factors consist of, of how they affect the administration, and to what extent this occurs.

Ramos, (1983:259) states that "formalism, as a strategy for making changes, is essential to developing countries". Analysis and interpretation of the practices in these countries, through further studies and research, would make fundamental contributions to the understanding and transformation of public administration. This would be so because identifying, studying, and generating scientific results about these practices might help transitional societies to make them less frequent in their societies. On the same lines Souza (1991:124) states that:

> "the issue of the formalism still needs to be intensely studied and discussed, once it seems essential to publish the results of other works and the analysis of those issues, so we could think about alternatives to narrow the difference between the discourse and the practice."

The Theory of Prismatic Societies and the presence of formalism in public administrative practices have already been used with success in the analysis of the public sector in transitional societies (Casate, 1990; Souza, 1991; Vieira 1996). These authors observe characteristics of administrative practices in different contexts of Brazilian society, using the 'Theory of Prismatic Societies' as the main theoretical background for the development of their scientific investigation.

Souza (1991) develops a study of theory and practice in the development of human resources policies in a local government context in Santa Catarina, a state situated in

the southern part of Brazil. The author begins by analysing some aspects of the formalism in the social and political structure of Brazilian society. The difference between the discourse and the practice, between what is defined in norms, laws, official documents and organisational practices, is characteristic of the history and of cultural, social and political aspects of Brazilian society. This characteristic of formalism can be observed clearly in Brazilian administrative practices which date back to the Portuguese period of colonialism, and can still be observed today.

The author also analyses formalism in the actions related to human resource policies in the local government of Santa Catarina state. She observes some characteristics of formalism in the management of policies on the recruitment of human resources, task allocation, procedures related to allocation of personnel to work, career system, among others. She concludes that the human resources policies of the period analysed were not developed as a result of rational planning but as a result of political confrontation between the state and civil servants for control of the scarce resources available.

On the other hand Casate (1990) develops an analysis of the legal, administrative and political aspects of equal pay (*Isonomia Salarial*) in Brazilian public universities. The research was conducted in three governmental universities, which are located respectively in the South, Southeast and Northeast regions of Brazil. In the work, the author analyses the implementation of the equal pay legislation for federal universities. She investigates the factors that caused the distortions between the content of the legislation, i.e. laws, decrees and regulations that deal with the salary equality system in the federal academic institutions, and the results of the personnel placement procedures carried out in the universities studied.

Although both authors have used the Riggs conceptualisation in the analyses of their work, they do not use the theoretical framework of Quality Management. A work which makes use of both theories, with emphasis on the Quality Management approach, was produced by Vieira (1996).

The author, in the research for his doctoral studies, compared the managerial practices of the Brazilian and Scottish prison services. The author analysed quality initiatives and the perceptions of quality in both organisations. His studies included

organisations which were involved in a formal quality improvement programme and others which did not participate in such a programme. Although the author used Quality Management as his main theoretical framework, he also discussed the influence of the environment on the performance of organisation. He also discussed Riggs' works in the context of his research.

Despite the fact that "there are organisations that do not have a quality assurance department or even a quality management program as a managerial tool" Vieira (1996:62) proposes the use of the concept of Operational Objectives, based mainly on the theoretical definition of Perrow (1978), as an alternative method of understanding quality initiatives in organisations. Vieira (1996:38) observes that:

> "it is suggested that in organisations where there is no formal quality program and the definition of customer is problematic, the quality varies and can better be understood through the identification of the operative objectives of different groups within an organisation in a specific period of time."

Instead of adopting a static and integrated visions of the rational and functional approaches to the analysis of organisational goals, his research adopts a structuralist framework. He observes that institutions often have many objectives, some of which conflict because they have not been agreed between the organisation and its members. This viewpoint does not accept that the objectives defined formally by the organisation are a full expression of the reality of an organisation. Analysing Perrow's work, he observes that the operational goals are the ones that represent the ends sought through the internal politics of the organisation. Accordingly, those operational objectives "indicate what the organisation is really trying to do, regardless of what the official objectives affirm" (Vieira, 1996:63). In addition, Vieira observes that Perrow's framework clearly links the formation of operational objectives to the interests, tasks and power of the dominant group in the organisation.

However, as observed by Vieira (1996), the work of Clegg and Dunkerley (1980) emphasises that organisational goals can also be modified by external forces. As a result, the influence of external factors and agencies on the improvement

programmes at organisations, and especially at the Institute, is a theme to be analysed in this research.

Vieira bases his analyses on an alternative approach to the study of quality, identifying the main organisational groups and their objectives within the organisation. The author also analyses the influence of environmental characteristics on the structure and processes of the organisations. His research seems to suggest that there is strong evidence that the variation in the perceptions and definition of quality in different contexts is, to certain extent, influenced by the environmental characteristics in which the organisations function.

An interesting point of his research is that the analysis of quality improvement initiatives as well as the analysis of the concept of quality need not be restricted to organisations which follow a formal quality improvement programme. An example of that is that one part of Vieira's (1996) investigation involves analysing quality in organisations which are not involved in a formal quality management initiative. This study reflects that model.

Vieira's work is primarily useful to us because it provides an evaluation of the effectiveness of a public sector service, namely prisons, in both Brazil and Scotland. This allows us to compare the stage of development that Brazil has achieved with the situation in a Westernised country such as Scotland, and gives us very helpful information on the extent of problems such as formalism in the Brazilian public sector.

Whilst Vieira's study is about a public sector service in Brazil, there are several points that we should note before we can say how useful his work will be in this thesis. Vieira's work concentrated on prisons in the South of Brazil, which exhibit some characteristics which make them different from Manaus and the Amazon region. It was also about the prison service, which does not have as highly qualified a group of staff as the Institute has to conduct research. It is likely that the presence of formalism in the activities of such a group would be greatly reduced. However, there are also some crucial similarities. Both institutions are part of the Brazilian civil service and none of the Brazilian institutions is following a formal quality management programme (the INPA's being a less systematic quality improvement

project). In addition, in Vieira's work and this study, both the prisons service and INPA depend on the services of a similar, poorly educated administrative support section. It is here in both services that the impact of formalism is likely to be greatest, and where we see the greatest similarities between the situation in the Brazilian prison service and at INPA.

Vieira's work is primarily useful as it appears to be the only available literature that directly focuses on the performance of a Brazilian public sector service, discussing both quality management techniques and the influence of the environment on the performance of organisations. Although we must consider carefully how relevant his conclusions are for INPA, it is clear that his work is more directly relevant than any other study that is available.

Despite the development of the studies cited, studies in the social sciences that would lead to understanding the mechanisms and administrative practices used, and the effects of the social environment on such services, are still in their infancy. Further work is needed to analyse the effectiveness of varying managerial strategies in Brazil. There is, therefore, an imperative that studies in this area must be carried out, in order to gain the required knowledge.

In order to carry out the study we are planning, we will require a sound theoretical framework, which will be based on the work already discussed in this chapter. So far, we have demonstrated that the required structure will come from the two basic standpoints of work that has been done in Total Quality Management, and the Theory of Prismatic Societies, as developed by Riggs.

Scientific studies have demonstrated that the use of Quality Management Strategies for improving the performance of business, services industries and public organisations across the world can be effective. In addition to the accounts of the use of such managerial approaches in the manufacturing sector, there are also several accounts in the literature of the use of this approach in different areas of services, such as hospitals, universities and schools. This shows that there has been a great deal of debate in many organisations about the most effective managerial strategies to improve quality. However, not many studies have been carried out on the applicability of such managerial strategies to academic contexts in developing

countries, and no such studies on the applicability of such managerial strategies to scientific contexts in emergent countries appear to have been undertaken.

Thus, it is relevant to conduct a study of the efficiency of the managerial strategies used at the Institute to improve the quality of their output, as required by the Excellence Programme. I therefore investigated the initiatives taking place at the Institute, through the analysis of information from the data collected from documents, from the interviews carried out and from my on-site observations.

Conclusion

The primary purpose of this chapter is to establish a theoretical framework for this study. We have considered the various difficulties that might prevent us from effectively applying a quality management approach to the improvement process, and have concluded that, although there are unquestionably difficulties in doing so, there is no theoretical reason why such an approach could not be used in an organisation such as INPA.

Previous research, as we have discovered, has concentrated largely on the success or failure of quality management approaches in private sector organisations in fully Westernised countries. Whilst there are accounts of the use of such strategies in both developing countries and in public sector institutions, there are few works which look at the use of such approaches in public sector bodies in developing countries, and none that could be found which look at the way quality management techniques have been applied to scientific institutions in Brazil or similar countries.

We have considered the differences between public and private sector institutions, and have realised that the use of quality management in the private sector is more straightforward, as the ultimate measure of success is simple - how profitable is the company - whilst in the public sector, one frequently has to meet a large number of often conflicting demands. It follows on that there can be several potential different definitions of success, and of improved quality. However, this difficulty, as Rago (1994) reminds us, does not mean that a public sector institution cannot improve, or use the techniques of quality management. Instead, it requires clarity as to what the goal of the improvement process is.

Once we have defined what we see as the aim of the quality management process, there is no reason why the techniques of quality management cannot be applied to the public sector.

The other major difficulty is in how quality management processes can be applied to developing countries. Several studies show the presence of what Riggs calls 'formalism', to varying degrees in different countries. Riggs' *Theory of Prismatic Societies* provides us with an effective explanation for the presence of formalism, and shows us why some of the problems which arise frequently in quality management programmes in developing countries are so persistent. Given that formalism inevitably exists to a degree in all countries and in all organisations, it cannot provide an insuperable barrier to the use of a quality management programme. Indeed, one might say that part of the essence of a successful quality management programme is that it reduces the presence and impact of formalism as much as possible.

Therefore, what Riggs' work does not do is to provide any theoretical or insurmountable practical reason as to why one could not attempt to apply a quality management programme in a scientific institute in a developing country. Instead it points out some of the difficulties which may be faced, which can allow one to plan how these problems may be surmounted.

Having scrutinised these issues, we must find what the characteristics of a successful quality management programme are, in order to compare the progress made at the Institute with our paradigm, in order to show how successful the improvement process has been. Following a thorough review of the literature, we find that Deming's Total Quality Management approach, as modernised in the work of Swiss, gives us the tool we need to scrutinise the work done at the Institute. It provides us with a succinct description of the attributes that make a quality management process successful, and has been tried and tested in the public sector. The work of Carr and Littman, although not academic, provides us with many of the reasons that TQM is appropriate for use in the public sector. These are that it assists in improving customer satisfaction, helps to ensure that resources are used efficiently, and provides an organisation that will attract high quality employees.

We have therefore established the theoretical framework that we will use to perform this study. We shall use the Total Quality Management approach to analyse the performance of the Institute, whilst bearing in mind the problems that quality management will inevitably face in the context of a developing country, and we shall rely on the analysis of Riggs' Theory of Prismatic Societies to explain and discuss these points.

Chapter 3 – Methodology

Introduction

The aim of this chapter is to outline the methodological framework in which this research project is conducted. This study is characterised as an organisational research project. The project comprises of a single case study carried out in a Brazilian government research institute using a qualitative research approach.

The research approach can be characterised as a case study. The improvement process at the National Institute for Amazon Research (INPA) can provide great potential for illuminating the organisation's cultural, quality and formalistic characteristics. According to Dixon, Bouma and Atkinson (1987), case studies are normally exploratory in nature and their main characteristic is to offer an ***in depth*** description of a certain reality which can enable the formulation of hypotheses for future work. However, the authors point out that not all case studies are exploratory. They can be used to test initial hypotheses of the relationship between variables without implying cause and effect relationship. This research has the characteristics of a case study because it comprises an *in depth* analysis, of a unique event in history of the organisation. It is mainly based on qualitative research methods, which often rely on analysis of events, narratives and other collections of descriptive forms to observe regularities in a specified context.

Research Questions

In order to achieve the main objective of this project, which is to analyse the quality improvement in an emergent centre of excellence in the Amazon region, the following questions were selected as a guide for the theoretical and empirical work:

- How is the concept of excellence defined at that scientific research environment?
- How is the quality of the organisation evaluated?

- What are the views of the international agencies involved, on the Institute?
- How far has the improvement process at the Institute been successful?
- Which factors have influenced the implementation of the improvement process? (eg: scientific policies, administrative or financial)

I have set out to answer these questions basically in three stages. First, the conceptual issues related to the quality management approach are discussed, then the issues involving the organisation and the improvement process are explored, and finally the information gathered during this research project is analysed.

Organisation of material collected

We have focused on the exploratory aspect of qualitative research to identify during the data collection the main issues on the process studied. However, in order to guide our efforts and give some direction to the data collection process, we have assumed some variables that were considered *a priori* as significant. When designing the guidelines for the interviews, general questions using simple terms were formulated considering that respondents were not familiar with the abstract language of theories such as excellence and formalism. Thus, in order to achieve the goals of the research, some issues are going to be analysed and investigated as described below:

Concept of Excellence

One of the key issues in a quality management approach is related to the definition of quality or, in this case, excellence in the specific context. As such, this important issue is going to be discussed and analysed in the present study.

Customer-driven approach

Considering customers as the first and most important element in a quality system approach means that organisations must identify their customers' requirements, and find ways to meet those requirements. The approach taken to identify and meet such requirements, as well as the way public organisations, and especially the Institute,

communicate with their internal and external customers, will be analysed in the research.

Improvement Process

The organisational changes undertaken in the Institute during the process of transformation can be investigated through the analysis of its implementation, in respect of commitment, motivation, improvements, resources involved, feasibility and so on. These are important considerations due to the fact that a better understanding, commitment and motivation to change can help the people who are involved in identifying and developing the skills and behaviours needed to make the changes more effective. In addition it is also interesting to analyse the factors which have been influencing the implementation of the Excellence Programme.

Scientific Production

Scientific productivity is one of the most important outputs of a research institution. Given the involvement of the Institute in a programme designed to improve the scientific research in the Amazon region, it is important to analyse improvements in the scientific productivity of the Institute.

Quality Evaluation

In this research I investigated both inside and outside the organisation the evaluation of the quality of the Institute. It is important to analyse how the quality of the institution is perceived, especially by its customers.

Data collection sites

The development of the fieldwork included visits to two cities in Brazil. These were Brasilia, the capital of the country and Manaus, where the research institute is located. The fieldwork was carried out in the period of 15 February 1997 to 18 June 1997. That was one month longer than originally planned.

In order to do an on site survey of the issues to be investigated in Brazil, the initial research plan included a two weeks trip to Manaus before going to Brasilia. However, due to restrictions from the Brazilian government agency which sponsored my project this could not be done. According to them, researchers being sponsored by them for a doctorate are allowed to visit a place only once during their fieldwork. For that reason, the plans to develop the first part of the fieldwork in Manaus before going to Brasilia had to be changed, and thus I went to Brasilia first. The fact that bureaucratic factors would have higher priority than scientific justifications can be characterised as an example of formalism.

In Brasilia visits were made to official premises where representatives of international agencies with some connection to the Institute are based as well as to offices where representatives from governmental agencies with some connection to the Institute worked. The second part of the first visit took place mainly at INPA's central main site, where the main sectors such as administrative areas, research units, laboratories, library and so forth are located. In Manaus the research setting was visited mainly during the office hours of the Institute. The business hours the organisation operated are from Monday to Friday, from 8:00 a.m. to 6:00 p.m., with two hours break for lunch (12 am to 2 p.m.). Visits were also made to other public organisations as well as local and university libraries. These visits were intended to collect relevant literature and documentation.

A second research visit

An additional visit to Brazil was made later during the period of the research. The only part of Brazil visited was Manaus and the visit lasted about 3 weeks from 16th April to the 11th May 1999. In that period, while there, I went back to the research site and several visits to the Institute were made. I was interested in making some further observations about the development in the Excellence Programme and contacting people to get some further information. In the period of that visit all my contacts within the Institute was made informally. No formal interviews were carried out.

Access

Access to the organisation was requested through formal correspondence to the director of the Institute. The letter began with a presentation of the researcher and the University. The title of the research, its main aims and its stages were clearly outlined in that letter. Access to written material which could be relevant to the research such as organisational records, strategic planning documents and annual reports was requested. It was also specified that interviews were going to be undertaken and, on that point the letter also mentioned that some members of the staff of the Institute were going to be contacted and interviewed.

The research proposal was accepted by the Institute with no restriction and consequently formal permission for full access as requested was granted. Despite the fact that the request to access the organisation was granted without objection there were in fact problems in getting access to some organisational records before and during the fieldwork as mentioned on the section on Instruments below.

As mentioned earlier, the first part of the fieldwork took place in Brasilia. As the capital of the country, and where most of the main agencies of the government are situated, it was the place where most of the key individuals of the international agencies which were going to be contacted, were located. The shortest part of the fieldwork was the work done in Brasilia, which took two weeks as planned. For that reason formal requests for interviews were made to the key individuals of those international agencies which were participants in this study. A presentation of the researcher, an outline of the research project, as well as the purpose of the interview were included on the written request. The requests were sent from Edinburgh before the fieldwork and it included the period of my stay in the city and the possible duration of the interview. Not all the replies to those requests arrived before my departure to Brazil to carry out the fieldwork. Therefore the times and places of some of the interviews were actually arranged after I arrived in the country. However there were no problems in arranging the interviews with people in Brasilia.

The same procedure of formally requesting and arranging interviews was not made for people who were going to be interviewed in Manaus. The reason for that was that Manaus was the place where the major part of the fieldwork was going to take

place and I would have plenty of time to arrange the interviews. As such the requests for interviews with the key participants contacted were made by telephone after I arrived in Manaus.

In most cases, it was not difficult to make arrangements to interview people, either in Brasilia or in Manaus, and it seemed that most of the people contacted were helpful and willing to see me. It was usually mentioned by the researcher the fact that it was a study which was been carried out as part of a PhD programme in a foreign university. It was felt that this information would sometimes facilitate the access to those individuals. However, there were quite a few cases where it was felt that some of the participants were not completely relaxed about giving out much information.

After arriving in Manaus, INPA's director sent through an internal electronic network system a message to all departments within the organisation, mentioning about my visit to the Institute and about my research project and asking people to give access to all information which was requested. Although this in some ways made access to people and documents easier, some people were not very keen in giving documents. Some documents (such as institutional annual reports and scientific programme reports) I only got by insistence, while others I could not get at all. The director also saw the development of the research as an important event and for that reason a summary of my research project was sent to the Brazilian Science and Technology Ministry, to whom INPA is directly subordinated.

Some support was also given to the conducting of the research within the Institute. I was allocated a desk in a shared office which I shared with two other people, as well as permission to use other facilities such as telephone, computers and photocopies. The organisation has got limited facilities for the production of photocopies and for that reason they make use of an external private company to carry out this work. Access to use this facility was also granted.

Interview Participants

All the participants contacted had, to some extent, a connection to the Institute. For the purpose of this study the participants are classified according to one of three

distinct characteristics. Some people were interviewed in Brasilia, while others were interviewed in Manaus. In Brasilia interviews were carried out with agents of the international agencies contacted, as well as with people working in managerial tasks occupying governmental posts. In Manaus people interviewed were mainly working at the Institute.

The sample included key representatives of governmental agencies, which have had close contact with the Institute. They were three people from the government working in Brasilia, closely related to the Institute, all of them working in managerial sectors. Just one of them was a scientific specialist, while the other two were people with economic and mathematics backgrounds. Those three participants were all public servants, linked to governmental offices. One of them was working in a high position dealing with Amazon matters at the Ministry of Environment. Another one was an administrator within the Science and Technology Ministry and the third one was a senior administrator with close working links with the Institute also working at that same Ministry.

The sample also included representatives of six international agencies totalling seven people, who had contact with the Institute either through scientific research projects or the institutional improvement project. Those participants of the group working in international bodies somehow involved with the Institute were linked to the following six international agencies: CIRAD, JICA, Max Planck Institute, ODA, ORSTOM, and the World Bank. More detailed information about each of these organisations will be presented in Chapter 6, although some brief information about them will be given below. Most of those interviewed that could be called clients of the Institute were scientific specialists with backgrounds related to areas of the Institute's work. Only one of those clients contacted had a slightly different background from the others; he had a computer science background. One of them even did his MSc at INPA.

I first had to identify international agencies with close links to the Institute, and then find relevant employees of those organisations to interview. In order to do this, those relevant documents that were available from the Institute and the Pilot Program were scrutinised and the homepage of INPA and the homepages of the international

institutions selected were searched. Those international organisations were chosen because they have or had been involved in scientific projects and programmes of co-operation with the Institute or were involved in the Excellence Programme. The international agencies with the closest involvement with the Institute regarding the Excellence Programme are the World Bank and ODA whereas the other agencies had more contact with the Institute through scientific cooperation programmes. We will now provide some brief information on how and why those international agencies were chosen as well as how they relate to the Institute.

CIRAD (*Centre de Coopération Internationale en Recherche Agronomique pour le Développement*) - CIRAD is one of the French institutions which has been involved with the Institute through scientific projects. The organisation used to be involved with INPA under a scientific cooperation programme. At the time of the interview their current scientific projects were being concluded and the proposals for new ones were under analysis by the Brazilian government. The contact with the agency was made after my visit to interview the key informant of the other French institution (ORSTOM) involved in this research. The CIRAD key representative interviewed was a member of the staff of the Centre with a scientific background. The interview was conducted in the Centre office in Brazil, located in Brasilia. Even though there were some language difficulties because of his lack of fluency in Portuguese the interview was conducted satisfactorily.

JICA (Japan International Cooperation Agency) - JICA was the Japanese organisation contacted for the purpose of this study. The interchange between Japanese and Brazilian scientists at the Institute is made through scientific research projects. Thus, the collaboration between JICA and the Institute, which has started only recently, is characterised as a scientific cooperation. One member of the staff of JICA was contacted and interviewed in the main office of the agency in Brasilia. Another office is in Belém, in the state of Pará, where some of the scientific staff is based. The agency staff member interviewed had a technical background, with a degree in Computing Analysis, different from most of the people interviewed who generally had a scientific background. Surprisingly he also did not seem completely relaxed in providing much written or even spoken information.

Max Planck Institute - The cooperation between German and Brazilian scientists is one of the oldest scientific collaborations going on at the Institute. For that reason it seemed important to contact in Brasilia people who could give me information about German/Brazilian co-operation and the relevant scientific research projects with the Institute. The participant contacted from the Max Planck Institute was a German government representative working in the German Embassy in Brasilia. He was a scientist acting as a scientific consultant for his country and responsible for the environmental as well as the science and technology cooperation between German and Brazilian government including the cooperation with the Institute. This was one of the two interviews conducted in English. It proved to be difficult to communicate with the informant because of his lack of fluency in English and because of a lack of knowledge about the institution and the projects themselves.

ODA (Overseas Development Administration, now DFID - Department for International Development) - The connection between ODA and the Institute is mainly through a scientific programme of co-operation. However, a separate programme of support from that development agency provides assistance to the Excellence Programme. A specific allocation of funds from the agency is made to the Excellence Programme which includes direct investment from the resources of ODA to the Institute, under the heading of technical cooperation. Accordingly, the agency is responsible for funding a separate set of activities at the Excellence Programme, including technical visits, scientific training, production of dissemination material, technical equipment and training in the use of scientific collections for the generation of scientific knowledge.

Two participants were contacted from the ODA, one in London and one in Brazil. The first interview was conducted in London with a person who was more senior in the organisation than the person working in Brazil. He worked as the head of a department responsible for programmes of scientific co-operation with countries in Latin America, in the premises of ODA in London. The participant interviewed in Brazil acts as a scientific consultant for the Agency in the country. He works more closely with the section responsible for the administration, control and evaluation of the projects between the agency and the Institute. Due to the fact that this person in Brasilia had a much closer contact with INPA through the projects and regular visits

to the Institute, the views about the Institute will be based mainly on the information given by this ODA representative (Henrique).

ORSTOM (*L'Institut Français de Recherche Scientifique pour le Développement en Coopération*) - ORSTOM is a French public organisation responsible for activities which promote scientific and technological development. The organisation has been involved with the Institute since 1979 through scientific programmes of cooperation. At the time of the research the organisation had submitted proposals for new projects for the analysis of the Brazilian government. The participant contacted in this French institute was a member of the ORSTOM's staff with a scientific background who had worked for some time at INPA, in Manaus, in co-operative scientific research projects between ORSTOM and INPA. The interview was conducted in their main office in Brazil, in Brasilia, which also housed some members of staff. The interviews were conducted in two stages which included 2 visits to the premises.

The World Bank (The International Bank for Reconstruction and Development - IBRD) - The connection between the World Bank and the Institute is through the Excellence Programme. As such it would be interesting to contact that institution in order to get more information about the Excellence Programme, as well as on their views about the process of improvement going on at the Institute. The World Bank was chosen by the countries that fund the Pilot Program (PPG-7) to be responsible for the administration of the financial resources of the Rainforest Trust Fund (RTF). Accordingly, as part of an evaluative exercise of the Excellence Programme, the Bank organises regular mission visits to the Institute.

An interview was carried out with a member of the staff of the World Bank in Brasilia. He is also a scientist, who has previous had links with the Institute, and has been developing some work related to the Centres of Excellence Programme.

As far as these international organisations are concerned, interviews were conducted with 7 representatives of the agencies. Two interviews were carried out with representatives of ODA and the other 5 interviews were with one representative of each of the organisations contacted. The first interview was carried out in London, in December 1996, with one of the ODA representatives and the other 6 were carried out as part of the fieldwork, in Brasilia from 15 February 1997 to 28 February 1997,

with the other participants from the international agencies. The interviews with people from governmental agencies in Brasilia were also carried out on the same period above mentioned and the remaining of the fieldwork was conducted in Manaus from March to June 1997.

At the Institute, 23 people were selected to be interviewed. These people fall into two separate groups. The first group is composed of those who were key participants in the definition, elaboration and implementation of the improvement process at the Institute. The second group is composed of those who would be affected by significant organisational change. They would include key management staff of the Institute (such as: directors, personal managers, research co-ordinators) and employees representatives as well as with researchers/technicians working in key managerial positions at the Institute.

Using the institutional strategic plan report, people who were participants on the planning process were organised in different groups as follows:

Planning Managers - 2

Technical-Scientific committee Members- 11

Institutional Group

Research Departments Staff - 15

Administrative Departments Staff - 11

Researchers and Technicians - 61

The total number of participants listed on that document who were key participants on the planning process was 98. Although the number of people in the groups is higher than that, it could be observed that two of the people listed were participating in more than one group.

However, not all the individuals were included in the sampling. The main reasons for this include the constraints on time for interviewing everyone involved and also

in order to get views from people who were involved in the planning process and those who were not directly involved in it.

At the time of the fieldwork the people who were listed on the strategic plan report were not all still employed in managerial posts. Indeed, different people were occupying several of the managerial posts at the Institute.

Despite that fact, two out of eleven of the Technical-Scientific committee members were interviewed. From the Institutional group listed above, three out of fifteen people working on Research Departments participated on this study. Two out of the eleven who were working in the Administrative Departments were contacted while 6 out of 61 people were interviewed among researchers and technicians at the Institute. Even though only 13 of the 23 respondents were named as strategic planners by the Institute, it was important to get a variety of perspectives on the improvement programme, including that of staff not directly involved in it.

Thus, in the sample process, the participants contacted at the administrative area of the Institute comprised three representatives of the top management of the organisation. They included the director of the Institute and the managers of the Programmes and Projects Advisory Group and of the Management Information Group. Also included in the sample were some representatives of the middle management of the organisation. Among those were the managers of the Departments of General Research, Administration and Academic Development, the manager of the Department of Planning, and another employee of that unit, who has developed an important work about the Institute, and a key representative of the Scientific Dissemination Sector. In the research area eleven out of twelve managers of the research departments were interviewed.

The sampling also included three individuals who were key participants on the Improvement Programme including the manager of the programme at the Institute and two key individuals who were responsible for the Technical Assistance and Scientific Dissemination activities within the programme.

For the sampling process I looked at the organisational chart of the Institute, and chose those individuals occupying managerial positions at the organisation. As such,

the main criteria for choosing the participants contacted were people who were occupying different managerial posts at the Institute and had a close involvement with the programme and others who have not had as much direct involvement with it, but the characteristics of their position at the Institute meant that they could provide interesting views on the process of improving the organisation. They may also be significantly affected by major organisational changes at the Institute. Thus, most of the people interviewed were occupying managerial posts at INPA at the time of the fieldwork.

Among those, ten people interviewed at INPA were working in the administrative area. Of those working in administrative departments, three out of ten people had social science backgrounds, but none of them had postgraduate qualifications such as masters or doctoral degrees.

The other seven working in the administrative areas all had scientific research backgrounds, with six of them working in the biological sciences. They were all working on developing managerial tasks for a fixed period of time, and ranged from the director of the Institute to people filling middle management positions. It could be said that of these ten, five were normally senior researchers, two were junior researchers, and three had non-scientific backgrounds.

Of the thirteen people working in the research areas, eleven hold managerial posts in research departments, and two were working exclusively on research related tasks. Eight of the thirteen were senior researchers and five were junior researchers. It should be said that some of those interviewed in both the research and administrative areas were working directly on the Excellence Programme, while others in both groups were not. People who are identified as senior researchers are those ones holding PhDs degree and have been longer at the Institute whereas junior researchers are those scientists holding up to MSc degrees, and administrative people are those working in the administrative area of the Institute.

Most of the thirteen working in research areas had doctoral degrees in Brazil. They were mainly people with education in areas related to biological sciences and with backgrounds in Biology, Agronomy, Fishing, Civil Engineering, Ocean Biology, Ecology, Nutrition, and so on.

A total of 33 interviews were carried out in this study. All the members of the international agencies as well as those governmental officials interviewed were males. At the Institute only 6 out of 23 people interviewed were females. For reasons of confidentiality, requested by some of the people interviewed, the use of fictitious names of the great majority of participants was made. In some cases, the similarities will be only coincidental.

Instruments

The data collected during the period of the fieldwork was gathered mainly by use of open-ended and semi-structured interviews with key individuals. Additional data was also collected by means of observations, informal discussions and use of administrative records in order to find needed information. The advancement of the modern technology also facilitated, in some aspects, the gathering of some of the information during the research process. The facilities generated by fast access to the Internet, through a computer enabled the accessing of some data, which was not possible to gather otherwise. Most of the information gained from the Internet was found through searches of newspapers and web pages.

Prior to the fieldwork, a reasonable amount of time was spent trying to get documents and relevant material which could help set the guidelines and the design of the research, and on the analyses of the available material about the Excellence Programme. It was hard to get hold of relevant material, which could have helped me to design a more specified research plan. As a result, the lack of "logistic" resources (documents and more detailed information about the organisation of INPA and of the Excellence Programme) prior to the fieldwork prevented the design of a more structured kind of research.

Access to written material was also used as a technique of data collection. However, deficiencies could be observed in the manner in which data is recorded at the Institute. Some administrative records were incomplete and there was a lack of organisation of some data. Some of that information I was looking for was related to financial records, as well as to human resources records. That information was, related to the financial aspects of the scientific co-operation at the Institute, that is,

the access, management and control of the resources coming from funding of international projects, the budget of those international projects and how these financial resources are managed and controlled, or some specific information in relation to human resources such as the number of foreign researchers, number of people involved on international projects, and so forth. In addition, it was also not possible to get detailed information on the flow of resources of the Institute and type of expenditures made by them. Being aware of the importance of organisational data to develop a fuller analysis of the study, several attempts were made to get hold to that kind of data.

Following advice from the Institute, information related to their personnel was formally sought in a written request to the Human Resources Department during the fieldwork. I was looking for more specific and detailed information about the number of employees, in which departments they are located, their specialisation according to their location at the organisation and so on. I asked for this information, but it was not provided while I was there. Before I completed the fieldwork, I went back to the Human Resources department to ask about my request, and was then informed that they did not have this information readily available, but that this data would be sent to me. Unfortunately I never received it. Much of the information used in the thesis therefore comes from internal reports of the Institute which could only be obtained later in my research.

It can be observed that, in spite of the Institute's own advice for requesting information through formal procedures, some of that data could not be obtained even after a written request. That information could not be obtained in the specific departments contacted, where this information could supposedly be found, and there was also not a record of it in the library of the Institute. Some of the reasons for that may be the loose control by the organisation of this kind of essential information. Institutional records were not organised in a way in which those data could be obtained, or the records were incomplete. Those difficulties in getting hold of some documents of the organisation might reflect the lack of organisation and/or lack of openness of the institution.

These problems of organisational records being out of date or failure in the collection of important information about the organisation may also be faced in developed countries, but they are most commonly found in other kinds of societies, especially those located in third world countries.

Another example of this was that the fieldwork was concluded in June 1997 but the annual reports for the two previous years were not yet available. This shows the lack of organisation of record keeping, as well as in the production of updated material related to the Institute.

A point worth making relates to the presence of formalism in Brazilian public administration, a theme discussed in the works of Riggs (1964), which can be observed in some of the administrative practices of the Institute. An example of this is related to the number of inconsistencies in data presented in the institutional documents available, analysed throughout this thesis, especially in Chapter 7. Inconsistencies in data presented in INPA's reports have shown us that data provided by the Institute cannot always be relied on.

One recent institutional report points out the weak nature of institutional statistics. The underdeveloped nature of the organisational records made it very difficult to develop a more detailed organisational analysis of the Institute though important conclusions could be drawn from the material available.

To find some relevant literature I went in search for other sources of material related to the Institute, some of it already mentioned, including a MSc. dissertation by Weigel (1994) developed as part of a postgraduate programme in a university located in the North east of Brazil. The author makes an interesting analysis of the organisation in relation to issues of Science and Development. A book based on that research was going to be published in Brazil. Another relevant source is an article published in a Brazilian scientific magazine based on another MSc. dissertation by Tony and Velho (1996) analysing the French cooperation with the Institute. More use of information from these cited materials will be made in this thesis.

The recording of information gained through interviews in the period of the research was done by the use of a tape recorder. Field notes were also taken and photocopying of relevant documentation whenever possible, was also made.

Data Analysis Strategies

As far as analysis and interpretation of data are concerned, use was made predominantly of qualitative techniques. However simple descriptive statistics are also used as a technical resource in order to facilitate the presentation of some data. The aim behind this is to develop an ***in depth*** study for a better understanding of this organisational study.

Another of the techniques used in the development of the analysis of the data collected was Issues Analysis, a technique which can be applied 'where the issues can be used as a means of organising and selecting material' (Robson, 1993). This approach for the analysis of data may be useful when the research is not based on a strong theoretical framework, as is the case in this study. Based on the utilisation of those techniques, a Table for Qualitative Evaluation was then devised. That table was designed with the application of a computer programme called Microsoft Excel and the use of that device was chosen in order to facilitate the qualitative analysis of the data obtained during the fieldwork.

Some of the reasons why a table to assist the data analysis was chosen, included: to allow me to summarise and organise information gathered from the interviews of key informants; to display all the relevant replies of all participants on one chart, giving a display and overview of the data for the qualitative analysis; to develop an initial comparison between the replies and respondents, and to allow to group information by category to help to keep the analysis performed as rigorous as possible.

The description of the process developed is as follows: the initial steps for the analysis of the data started with the transcriptions of the interviews, which were recorded on tapes. The great majority of the interviews were conducted in Portuguese, except the ones with the person from the ODA interviewed in London and the person from the Max Planck Institute, which were conducted in English.

The transcription of the interviews was made both during and after the fieldwork. After the transcriptions of all the interviews were completed a selection of the material to be included on the Table for Qualitative Evaluation (Appendix 1) was made. Some of the themes included on the table were directly related to questions specifically asked in the interviews according to the interview guidelines developed for the fieldwork. Other relevant information were also selected, according to the frequency mentioned during the interviews or for its importance which was determined according to the emphasis given by some participants. The interviews were then analysed for more details on the important issues selected earlier and extracts from those interviews were taken and inserted in the table. As most of the interviews were conducted in Portuguese, the extracts from the interviews carried out in that language were not translated into English at that stage. As such, most of the extracts inserted in the table are in Portuguese.

The basic structure of the table has the individual respondents in the columns, while the rows represent the various issues to be analysed. Thus individual cells will provide us with a given individual's views on a specific issue. In order to help the reader to have an idea of the work developed, and to give a better illustration of the time and work involved on the design of the chart, an extract from the comprehensive table is presented in Table 2 (in Portuguese) and Table 3 (in English). The contents of the whole Table are included in Appendix 1.

Table 2 – Representation of the table for qualitative evaluation in Portuguese

CL A		RES	MARCIA	ALFREDO	EDUARDO
2	21 Def Excel	26	Seria a Instituicao especializada em Amazonia, que tem a maior parte dos recursos humanos voltada pra essa area de interesse, seria a instituicao onde existe um maior numero de pesquisadores ou de pessoas envolvidas pra estudar determinado assunto.	Alta qualidade vem nas instalacoes, da formacao das pessoas, recursos financeiros pra pesquisa de forma regular, porque tem que conseguir um equipamento ou buscar recursos, enquanto deveria trabalhar na pesquisa, ai' CE vai por agua abaixo.	Excelencia significa ter condicoes otimas pra trabalhar, pra desenvolver pesquisas, ter pessoas capacitadas, equipamentos, pra ser CE, teria que ter poucos problemas, nao ter problemas basicos, carro pra excursao, nao tem, pra CE precisa melhorar muito.
2	37 Id. Trans	26	Se interessa existir CE pra estudar problemas, tentar desenv. sustentavel nao existe outra melhor que INPA, pesquisa ha' 40 anos, mesmo fragmentada, existe informacao, pesquisa sendo feita e resultados sendo publicados, e' onde se desenvolve pesquisas.	Dar condicoes p/ grupos fazer pesquisa de qualidade numa area de importancia mundial, Amazonia, a ideia e' muito boa, veio na forma de infra-estrutura fisica, predios, instal. hidraulica, eletrica, rede de esgoto, e dinheiro p/ pesquisa, processo competit	Acho a ideia muito boa, a Amazonia precisa realmente, entao acho que o programa tem sido muito bom, no sentido de estimular e ajudar nas pesquisas e de ter mais uma fonte de recursos.
3	3 Atividades	23	A atividade e' manter agenda de pesquisa, tinha mais 200 proj, no plan estrat. definiu 47 proj. em 9 prog., 1 coletanea do q existia, criamos PPI's, faco distribuicao e acomp orcam. de proj, participo reuniao de editais de proj, mando proj p/ avaliar.	Basicamente sou a pessoa responsavel pelo tramite de recursos, financeiros, entre outras coisas o tramite de compra, recursos financeiros no INPA, por ex., as ligacoes telefonicas, fax, tudo isso passa na minha mao pra dar uma permissao.	O coordenador responsavel p/ elaborar e desenv. projetos, ver que esta' relacionado c/ area, responsavel p/ q acontece na parte adm. e projetos, mostrar INPA e departamento, proj de pesq q tem aplicacao c/ ind, recursos da coordenacao, distribuir ativ.
4	42 Infra Est	20	Tem melhorado, mas ta invest. 1 estrut. que 10 anos nao tera quem trabalhe, forma mestre e doutor, eles n~ sao aprov., perdemos pesq, n~ repos, infra adeq, tera predios novos, mas equip. ta obsoleto, mat. e equip. da p/ resolver, mas n~ tem contrato p/ qu	Tem 2 carros. C/ dinheiro G-7, melhorou est fisica, const. predios, c/ reforma Agron., lab. criados, espaco p/ estudantes. Comprou carros, equip. p/ INPA todo, equip sofist/caros, falta coisas menores, apar. oticos, mat. de inform., falta melhorar.	Estrutura boa, razoavel se comparo c/ Uni do nordeste e sul. Infra-estrutura, muita vez falta muita coisa, o basico tem. Laboratorios, equip., transportes, dinheiro p/ excursoes, isso e' o basico pesquisa, minimo de mat. de lab, em geral consegue trabalha
5	17 Comun.	19	Complicada, falamos linguagem diferentes, mesmo trab. na adm. e' dificil colaboracao, pesq. estao area fim, pelas dificuldades financeiras, insat. geral, n~ sao muito dispostos colaborar, qdo pesq. sai p adm. colab. diminui, e' dificil, relacion. complic	Inicio coord. e' dificil, exist. racha q ganhou e perdeu, ele e' mais mediador dos prob. internos, n~ poder de decisao, procuro n~ tomar atit. isoladas, norm. tem confrontos c/ coord. Inter. coord. c/ pessoas passa ser diferente, leva tempo p/ tratar cada	A comunicacao e' relativamente facil, pesq. tem acesso a coord. na hora que precisam, de certa forma atrapalha trabalho do coord., que fica voltado p/ prob. adm., acesso tao facil q. complica, se reservar tarde p/ des. trab., tem q. ficar sala incomunicav
5	43 Gerenc.	19	Adm. imediatista, n~ tem org. p/ n~ ta apagando incendio, tem q. adm. dia dia e plan. est., aparece editais, correm todos, faz proj. q. n~ vem orc. ou n~ atende nec., n~ resolve coisa forma global. Buroc., cont, tinha q. ter dinheiro geral p/ pesq. ou tre	Osorio leva c/ proj. pessoal, consulta, acaba dec., vant. ta' presente, falta hier., antigo coord. geral chamava p/ achar solucao, rec. tem tanto p/ gastar, dinamica maior, sentia + asses., prob. coord. tem ido Osorio, devia ir coord, falta Osorio bem ass	Projetos dinheiro nao suficiente e liberado no prazo, prob. adm. sao grandes, ar-cond. central, pra mim e' frustrante, precisa equip. func., energia. Direcao ta' caminhando, apoia pesquisa, procura G-7, contato c/ ele, reunioes, discutir, coord. consultad
19	Agenda Pesq.	19	Com PE definiu-se 46 proj. dentro de 9 programas, PPI's, acabou sendo coletanea de coisas q. existiam, colcha de retalho, agora tem agenda de pesquisa com 47 projetos (PPI's), comecou 95, duraria 1 ano, aumentou mais 1 p/ terminar em 97, sobrou recursos.	Pesquisador ta ligado a projeto. Pede rec. tesouro, vem 50%, libera so' julho. Proj. implementados 95, foi melhor ano, existia feedback, ficaram mais soltas. Recursos e' irregular, tem conseguir dinheiro, deveria trabalhar na pesquisa.	Muitas vezes dinheiro dos projetos nao e' liberado no prazo pra desenvolver pesquisas, e em geral e' insuficiente. Recursos pra manutencao nao tem como justificar no projeto, nao ha' verba p/ isso. Tem limitacoes, determinadas epocas nao sai p/ treinament

Table 3 – Representation of the table for qualitative evaluation in English

CLA		RES	MARCIA	ALFREDO	EDUARDO
2	21 Excel Def	26	It would be an Institution specialised in Amazon, with most of its staff interested on that area, it would be the institution where there is the greater number of scientists or people involved to study specific subjects.	High quality is a reflex of the infrastructure, human resources development, regular flow of financial resources. Now we have to spend time trying to get a equipment or get funding, when we should be spending this time in research, this way, the idea of Center of Excellence will vanish.	Excellence means to have good work conditions, to develop researchers, to have qualified people, equipment. To be a Centre of Excellence it should have only few problems, not basic problems, car for fieldwork we do not have. It needs to improve a lot to become a CE.
2	37 Id. Trans	26	If there want to create an EC to study the problems, and the sustainable development there isn't a better institution than INPA, who does research for 40 years, even if fragmented, there is the information, research been carried out and results disseminated, it is the place where researches are developed	To give conditions to groups to do research of quality, in an area of world-wide importance, Amazon. It is a very good idea, it came in the form of infrastructure, water and electric	I think it is a good idea, the Amazon region really needs, so I think that the project has been good, in the sense of motivate and help in the researches, and to be an extra source of funding.
3	3 Activities	23	The task is to manage the research agenda, there was more than 200 projects, in the strategic plan it was included 47 projects in 9 programs, like a collection of what already existed, it was created the PPI's, I make the control of the resources of the projects, take seat in project definition meetings, send them to evaluation and so on.	Basically I am the person responsible for the management of the flow of the financial resources, among other things the acquisition of material, financial resources at INPA, telephone bills, fax, all of these comes to me for authorisation.	The research department director is responsible for the elaboration and development of projects, to analyse if it relates to the department area, be responsible for what happens in the administrative area and in the projects related to the department, for research projects with industry application, for the department funding, for giving tasks for people and so on.
4	42 Infra Struc	20	It has improved, but investing in a infrastructure where there won't be researcher in 10 years time. We graduate MSc and PhD's but can't recruit them, researchers have left, infrastructure is inadequate, equipment outdated. Material and equipment is easier to solve but not recruitment of scientists.	There are only 2 cars. With the G-7 money the physical infrastructure has improved, new buildings has been erected. With the changes in the Agronomy department, new labs were created, and more space for students. New cars were bought and equipment for the whole Institute, expensive and sophisticated equipment, but there are still a lack of a lot of things, optical equipment, computing equipment, it needs to improve.	The structure is reasonable if we compare with some Universities in the North east and south of the country. In terms of infrastructure there is a lack of so many things, but the essential we have. Laboratories, equipment, transport, funding for fieldwork, that is essential for research, in general we can manage to work
5	17 Comun.	19	Complicated, like we talk different languages, even when we work in the administrative area, it is difficult, researchers are in the main area, why don't now why, financial constraints, general dissatisfaction, not everyone is willing to help, when researcher goes to the administrative area, get less help, it is difficult, complicated relationship.	At the beginning [of a new management] it is very difficult, probably partly because it works like that: there is an election for the manager of research department ... and at the beginning I think there is a certain division between who wins and who lose ... first of all the position of the research manager much more a position of mediator of the internal problems and not much a person who really has got the power for decision.	The communication is relatively easy ... the researchers get here and have easy access to the management of the department, whenever they need ... this sometimes mix things up at the management, because ... the manager has to deal mainly with the administrative work of the department whereas the scientific work is sometimes neglected ... [so] the access becomes so easy that it complicates ... as such if I try to book a whole afternoon to concentrate on my work and ... try to write something, whenever I had to do this I ended up staying locked up on purpose in another room.
5	43 Manag.	19	Imediateness management, there isn't a good organisation, we have to manage the day to day and the strategic plan, application for projects, all get excited and define the project, but the resources doesn't come or is not enough, this problems are never solved. Bureaucracy is huge, we should have the resources only for the research area.	Osorio manages in a very personal way, he ask people but he decides in the end, the advantage is that he is always at the Institute, but there is a lack of hierarchy, the former general research director listened to people, asked for solutions, there was more transparency and dynamics, more support. Now department head goes straight to Osorio, when we should go to general research director. Osorio needs better advisory group.	Funding for the project are not enough and available with delays, problems with the administrative area are huge, no central airconditioning, and this things for me is frustrating. We need equipment working, electricity. Management of the Institute is working, support projects, gets funding from G-7, we have contacts with him, he makes meetings, discuss matter, the researchers managers are listen.
19	Res.Agenda	19	With the strategic plan it was included 200 projects in 9 programs, it end up like being a collection of what already existed, like a patchwork sheet, but now we have the research agenda, with 47 projects (PPI's), it started in 95, it would last 1 year, but it became bigger and is probably going to finish in 97.	Researcher is connected to projects. He asks for funding from Central Government, but only gets 50%, and it is available only in July. [New] projects were implemented in 95, it was the best year, there was feedback. But now things are more relaxed, funding is irregular, we have to try to get funding for ourselves when we should be working in research.	Most of the times the project funding is not available according to the timetable to develop the research, and in general is not enough. There are a lot of limitations, some periods no one goes on training.

The categories used in the matrix represent the issues mentioned most frequently by the participants during the interviews. Those categories were organised in the table from the most frequently mentioned to the least mentioned, with the ones on the top representing those most frequently expressed. The categories are:

- Professional background (*Formação profissional*) - details about the participants in terms of education (degrees, training, etc.) and working experience.

- Excellence definition (*Definição de excelência*) - definition of excellence from each subject interviewed.

- Opinion about the transformation process (*Opinião sobre o processo de transformação do Instituto em um Centro de Excelência*) – views from both inside and outside participants about the process which is going on in the Institute.

- Description of their activities (*Descrição das atividades*) - past and current activities of the participants interviewed were mentioned.

- Evaluation about the work of the Institute (*Avaliação sobre o trabalho desenvolvido pelo Instituto*) - different views of the participants about the work developed in the Institute.

- Infrastructure (*Infraestrutura*) - interviewee's opinions in relation to the infrastructure of the organisation.

- Projects and Researches (*Projetos e pesquisas*) - comments about projects and researches in the Institute.

- Communication (*Comunicação*) – the impact on work and human relations between different areas/individuals within the Institute.

- Management (*Gerenciamento*) - opinions of the participants in relation to the management of the organisation.

- Finance Resources Management (*Gerenciamento de recursos financeiros*) - short descriptions about the way their financial resources are managed.

- Evaluation of the Institute (*Avaliação do Instituto*) - support/criticism of the current situation in the Institute.

- Politics (*Política*) - views from the participants in relation to scientific policies and indicators, governmental policies, and so on.

- Quality Indicators (*Indicadores de qualidade*) - opinion about what would be a quality indicator in the context of a scientific research institute.

- General Interests about the Institute (*Diversos interesses com relação ao Instituto*) - why there has been such investment in the Institute, what reasons are there for external involvement, etc.

- Decision Making (*Tomada de decisão*) - description of the sort of decisions that the subject can make which would affect the Institute (Brazilian government participants only).

- Opinions about the Institute (*Opiniões sobre o Instituto*) – opinions from both internal and external individuals about the organisation.

- Research agenda (*Agenda de pesquisa*) - comments about how the research agenda was defined and/or how it has been carried out.

The first three columns of respondents represent those participants from Brasilia, closely related to the Institute and working in governmental offices. The following six columns display people from the international agencies interviewed in Brasilia. The remaining columns represent the participants from Manaus, working in the Institute. Under the participant's name each cell sums up the subject's replies, according to their views and opinions on that specific issue.

Although the design of the table was a tool which could facilitate the analysis of the data, some of the categories included on the table were of greater importance than others, whilst some also left little scope for analysis after the data was collected.

The use of the table was a very important tool to define a methodology to analyse the data. When the most mentioned of the categories were included on the chart, it could give me a general picture of the data obtained at the fieldwork. On a second stage, I looked at them with more detail and chose those categories which seemed at first the issues most mentioned by participants. At that stage, a selection of the categories that were going to be analysed was made, as well as the selection of the extracts which would be used in the analysis of the data. After that, the translation into English of the extracts of the interviews conducted in Portuguese which were going to be used in the analysis took place, followed by the analysis of the specific data selected.

Conclusion

This chapter has reviewed the methodological aspects involved in this research. It presented details about the two visits which were part of the fieldwork carried out in Brazil. A total of 33 interviews were carried out as part of this research and organisational documents were also systematically analysed. The chapter has presented some difficulties faced during the research and many of them mainly of a formalistic nature. These difficulties could give a hint of the complex task of carrying out an improvement programme in such an organisation. Despite the adversities it was possible to carry out the research.

The involvement of international organisations and the participation of international actors in the improvement process give an important additional reason for this investigation.

Chapter 4 – The Approach to Excellence and the Improvement Programme in the Institute

Introduction

The main purpose of this chapter is to consider the improvement process at INPA, exploring the quality improvement approach at the Institute. It starts by giving background information about the improvement process at the Institute, it explores the formal definition of excellence in the present context, it identifies the characteristics of the organisational improvement process at the Institute, and it also scrutinises the central formal guidelines produced for the changing process.

The Origins of the Excellence Programme

A programme to conserve the rain forest

The background to INPA's history and scientific mission and to the internationally-mandated improvement programme launched in the 1990s was set out in Chapter 1. Here, I analyse in more detail the factors that led to the institution of the improvement programme at the Institute.

In recent years, the global dimension of environmental problems and their impact upon the future of the planet has generated world-wide concern. As part of those environmental concerns, the world has witnessed a greater awareness about the environment and the conservation of the natural resources of the planet on which we live. The Amazon tropical forest, being one of the last rain forests remaining in the planet, its deforestation, and the inadequate use of its soil and natural resources has played a great part in those concerns. According to Hurrel (1992:399) deforestation of Amazon has become an issue of primary importance "because of its global

ecological impact in terms of the loss of bio-diversity and its contribution to global climate change".

The need to protect the Amazon rain forest became a focus for debate during the 1990s, engendering interest in the need to preserve the natural environment, the economic value of the region's products, and the need for controlled and pragmatic socio-economic development in Brazil. It was appreciated that 'blame' for deforestation did not rest solely with the Brazilian government - overseas demand and multinational exploitation could also be recognised as contributory factors. However, for many years the Brazilian government appears to have been motivated by the need for economic development regardless of its natural resources.

Mounting concerns about the conservation of the Amazon rain forest exerted some pressure upon the Brazilian administration and led it to recognise and confront the issue. Yet any conservation programme had to take into account the need for continued social and economic development in Brazil - something that required external assistance.

Accordingly, the need to conserve the remaining tropical rain forests, and the explicit concern and recognition of the need for external assistance to preserve the Amazon, was discussed at the Group of Seven (G7) summit at Houston in July 1990 (Hurrel, 1992), during which it was decided that the governments of developed countries should collaborate with the Brazilian government in a project named *Pilot Program to Conserve the Brazilian Rain Forest*, which developed a set of initiatives aimed at conserving the rich natural sanctuary.

Pilot Program to Conserve the Brazilian Rain Forest, or PPG-7, constitutes a "set of activities that will contribute to a reduction of the rate of deforestation in the Amazon Rain Forest, while using its resources sustainably" (World Bank, 1991). With initial support from the United States and United Kingdom governments, the Commission of European Communities, and the Rain Forest Trust Fund, the project, executed by the Brazilian government, involves total investment of around US$48 million. This investment corresponds to the total resources for all the projects of the Pilot Program as a whole (which includes the Science Centers Project).

The *Pilot Program* is divided into four sub-programmes. These are:

- Natural Resources Policies;
- Demonstrative Projects;
- Natural Resources Management and Conservation Units;
- Science and Technology

The Science and Technology sub-programme was designed to strengthen scientific institutions while supporting the development of scientific research; and to achieve this, it was divided into two further components - the Directed Research Project and Science Centers Project.

The Directed Research Project was designed to offer financial support to research initiatives (World Bank, 1994). Projects would be evaluated and selected on a transparent and competitive basis, and priority would be given to proposals responding to gaps in present research need and demand.

A principle objective of the Science Centers Project was, and remains, the setting of certain conditions for the two research institutions in the Amazon, INPA and the Emilio Goeldi Museum, so they become 'Centres of Excellence' in environmental research unique to the region. (Initially named the Excellence Programme - this term will be used to refer to the Science Centers Project). The direction of the programme was influenced by the belief that it was necessary for organisations involved in the generation of scientific knowledge about the Amazon to become more effective.

The infrastructure in existence for the scientific development of the Amazon region can be considered inadequate, while dependence upon inconsistent government funding further weakens activities. One of the early steps taken in the project was the development of an evaluation, requested by the Brazilian government to the US National Research Council of the National Academy of Sciences. The activities involved were intended to assist Brazil with an evaluation of the Institute in order to identify activities and needs for improving the organisation to serve as a reference centre in the Amazon region. In August 1993 another evaluation was also developed,

but at this time, mainly with participation of Government officials. More details about this evaluation are given later in this chapter.

As highlighted by World Bank (1991), "decline and variable governmental funding for scientific research...lack of clear institutional research goals, low salaries and exodus of best qualified staff, and the lack of a performance evaluation system", has been constraining factors in the performance of the Institute. For a successful programme of excellence to be achieved changes would be necessary.

According to the World Bank, administrative staff at INPA works in a typical 'public-service' structure which potentially undermines the performance of the institution as a whole. The Institution was linked to the governmental sector, leaving it vulnerable to bureaucracy and rigid rule constraints. Different groups that compose the whole organisation had different positions and goals with respect to future change. Finally, not only it is important that scientific practice matches international standards, but the knowledge produced should be accessible, useful, and be one of the main points of reference for developmental policies in the region.

Development programmes are often used to improve the performance of organisations in meeting their objectives in a rapidly changing environment. These programmes are generally designed to improve the capacity of institutions to achieve specific goals, which are often demanded by external sources (governmental policy, funding agencies, scientific community, etc.). The next section will give information about the organisational improvement approach at INPA.

The organisational approach of the Institute

I will now introduce the improvement approach adopted by the Institute. This section is divided into three parts. The first part explores the definition of 'excellence' at the Institute. I then provide a summary of one of the first evaluations of the Institute in the beginning of the improvement process and finally describe the two main documents which describe the organisational improvement process at the Institute.

The Definition of Excellence in the Science Centers Project

An important issue in the analysis of the improvement process at the Institute concerns the definition of the term 'excellence' in that context. The improvement process is designed to turn the Institute into a Centre of Excellence. However, in considering the meaning of the concept of 'excellence' at the Institute it is important to note that the Institute had no clear definition of 'excellence' in the improvement process. Thus a clear definition of the term 'excellence' at the organisation and in the documents related to that changing process could not be found. In commenting on the strategic planning process which occurred at the Institute a World Bank publication (the MOD later described) (World Bank, 1994:49) observes that:

> "the definition of Centre of Excellence by the strategic planning staff included the notion that a Centre of Excellence has to have strong impact on both knowledge and social change"

However, the utilisation of the term Centre of Excellence is not confined only to the Brazilian scientific context. During the fieldwork carried out in Brasilia, I came across a twenty pages document entitled *White Paper on Science and Technology – 1995 – Fifty Years of Postwar Science and Technology in Japan.* It is a Japanese document which I got when visiting CNPq, the Brazilian Council for Scientific and Technological Development, which is also a research funding agency. In the document it is clear that in Japan the terminology of 'excellence' is used throughout the country's science and technology policy. That summary of the 1995 Japanese White paper on science and technology, published by the Science and Technology Agency of Japan (STA, 1995:11), in defining 'Centers of Excellence', observes that:

> "a Center of Excellence is a central research institute with distinguished researchers, the latest research information, superior facilities and equipment, and an advanced support system"

The document adds that such organisations should be capable of attracting talented foreign researchers and to do so the country should first secure researchers capable of international activity, with internationally recognised ability. Thus, a research institution of Japan which wishes to become a Centre of Excellence, should: have the remuneration and employment systems which enable it to attract the staff it needs;

establish the support system and research environment necessary to attract the nation's most capable researchers; create a system which allows researchers to study and enhance their skills; and, finally, equip itself with the facilities and equipment needed to perform research of international standards and produce results that are recognised as excellent by other nations (Science and Technology Agency, 1995).

Although there is not clear evidence on the links between the improvement process at the Institute to help transform INPA into a Centre of Excellence and the White Paper on Science and Technology in Japan, it is useful to observe how well the Japanese document defines the essential characteristics of a Centre of Excellence. It would be compatible with the ideology behind the Science Centers Project if the definition of 'excellence' described in the Japanese White Paper were also used in a publication, either from the World Bank or the Institute, on the excellence improvement programme at the organisation. If that was the case it would be an important reference for this research, in trying to identify the World Bank ideology. However, it seems to be completely unrelated material.

What can be concluded is that at the Institute, the use of the term 'excellence' seems to be used only in a rather abstract way and does not involve any official status or objective that the Institute needs to achieve. As mentioned earlier, this improvement process does not involve any striving for quality certificates by the Institute, from quality assurance evaluators or companies, or from the groups involved in financing the improvement project. It is not clear then when, how or by whom the Institute could be evaluated to see if the aim of transforming it into a Centre of Excellence has been achieved.

Although Carr and Littman's (1993:66) work suggests that one way to achieve excellence is through the implementation of TQM in the organisation, they also recognise the problem of achieving an intended level of quality. The authors point out that there is a difference between arriving at quality and the search for quality, they state that:

> "the idea of *arriving* at quality is anathema to TQM. To seek quality is something different. That search is called "continuous improvement". The philosophy of TQM teaches that an organization must constantly strive to

> improve. To do otherwise would engender a sense of complacency, which leads to stagnation, which leads to ruin. In a more practical vein, perfection is impossible, so why delude ourselves by thinking we can achieve it?"

Another point to be made is that the strategy of creating two centres of excellence may be unnecessarily inefficient. Instead one could be strengthened, and funds directed to it. It might then be better able to serve as a point of reference, as a centre of excellence, for research in the region. However there is variation in the types of activities and scientific knowledge developed at INPA and at the Museum, although both organisations have some activities in common. There is insufficient evidence that having two centres (Emilio Goeldi Museum and INPA) would imply that they would be competing institutions in development of research in the region.

The Science Centers Project observes that those two research organisations are going to serve as pilot studies in which different approaches including legal reform, performance incentives systems and the diversification of funding sources will be tested. If the project were to be successful, other institutions would be considered for similar development.

The improvement process main guidelines

There are three main guideline documents involved in the Institute's improvement process. The first one is part of a Brazilian Government's exercise carried out in 1993 which resulted in the document named 'INPA as a Centre of Excellence in Research in the Amazon'; the second one is the Strategic Planning Final Report, the result of a process of strategic planning conducted at the Institute in 1993, which is described in a fifty-three page document called Strategic Planning Final Report INPA (1994), and finally the MOD a World Bank document.

With the prospect of being transformed into a Centre of Excellence, the Institute was asked to undertake that strategic planning exercise in order to develop an organisational analysis of its activities, an evaluation of its weaknesses and strengths and to assess its potential to make use of such investment. As the document was developed by the Institute in such an early stage of the process, the document gives

only information, analysis of internal and external scenarios and recommendations in a general terms, not being too specific in that description.

The MOD, a short for Memorandum of Director was drawn up by the World Bank. This is an official document of the World Bank and sets out the general strategies of the Science Centers Project. Although both documents, the Strategic Plan Report and the MOD, were produced in the same year (1994), the MOD was produced later than the Strategic Plan and the guidelines described in the MOD were based on the Strategic Plan developed by the Institute. While, on the one hand, the INPA's document gives only general analytical information about the Institute, the MOD gives more specific guidelines for the improvement process at the Institute.

According to the World Bank (1994:46) document, "the methodology selected for the strategic planning exercise was participatory and systematic and sought to integrate studies describing regional issues with an internal analysis of the institutions, including a careful examination of the internal organisational structure. In addition, the strategic planning process was carried out in such a way as to ensure continued long-term strategic planning processes in the institutions".

Given that the cited documents can be characterised as important reference points for the improvement process, the following sections outline the structure of each document and trace the connections between them.

The Brazilian Government Exercise - 1993

On the fifth of August 1993 the Secretary of Science and Technology (the previous name of the MCT) through *Portaria* no. 475 (special normative document) established a committee, chaired by the Secretary of the unit himself.

The committee would be responsible for identifying, studying and proposing solutions which would enable the Institute to have appropriate technical, scientific, administrative and financial support to be transformed into a Centre of Excellence (INPA, 1993). The report observes that this activity would make a significant contribution to the discussion and development of strategies for the consolidation, strengthening and development of INPA as a Centre of Excellence in the Amazon region.

The committee was then divided into four groups. Committee 1 was composed of representatives of the Superintendent for the Development of Amazonia – SUDAM (*Superintendência do Desenvolvimento da Amazônia*), the Strategic Issues Secretary – SAE (*Secretaria de Assuntos Estratégicos*), the Brazilian Institute for the Environment and Renewable Resources – IBAMA (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis*), the Environment, Science and Technology Amazon State Secretary (*Secretaria de Estado do Meio Ambiente e Ciência e Tecnologia do Governo do Estado do Amazonas*) and INPA.

The document observes that the work of Committee 2 was co-ordinated by SUDAM, which was also responsible for the elaboration in January, 1993 of the resultant report entitled *O INPA como Centro de Excelência em Pesquisas na Amazônia* (INPA as a Centre of Excellence in Research in the Amazon) (INPA, 1993). The components of the Committee were representatives formally appointed by each of those organisations involved in the external evaluation.

Each of the four Committees would be responsible for:

- Internal Analysis of INPA (its potentials and problems, with more emphasis on the academic aspects);
- Assessment of needs and demands in relation to scientific research and technology of the Amazon, according to perspectives and strategies of regional development;
- Study of the opportunities for getting national, regional, local and international funding; and
- Analysis of administrative aspects and legal and institutional status restructure.

The document analyses the general potential of the region and strategies for research; the needs and demands for technology and scientific knowledge; and an internal evaluation of the Institute. The internal evaluation analyses the scientific production of the Institute, the number of researchers, and the salaries paid to scientists of the organisation. The report also analyses the types of scientific collaboration going on at INPA, as well as the different sources of funding. In addition, a study of the changes

in the legal status of the Institute, in order to provide it with greater autonomy, is also undertaken.

The aim of this exercise seems to have been to provide the Brazilian government with an evaluation carried out in an internal level. The idea, one can imagine, would be to have a document produced by governmental officials, and as such, by an elite/specialised group, with an assessment of the Institute, producing their own views about the organisation.

Institutional Strategic Plan - 1994

The elaboration of the strategic planning at the Institute was an exercise which followed a recommendation made by a Scientific Advisory Group of the United States National Research Council of the National Academy of Sciences of that country. The Group made an assessment of the organisation in order to identify actions and needs for developing the organisation. They suggested that the Institute should undertake a strategic planning exercise to address some of the deficiencies identified and hence strengthen the organisation (World Bank, 1994).

Despite the fact that there is not enough evidence on what the first steps were in the hiring of that American scientific group, or on the procedures or actions that were involved before the request was made, the strategic planning exercise was most certainly one of the first steps in the improvement process at the Institute, undertaken in the hope of being transformed into a Centre of Excellence. The extent to which the World Bank was involved in recommending the scientific group is not clear, although there is a high probability that there was such involvement. Neither was it possible to identify the members of the advisory group. There is a real possibility that the development of the strategic planning exercise resulted from a World Bank request.

Although it is not clear if the elaboration of the strategic plan was the result of a request of the World Bank, the fact that part of the investment on the planning exercise was made by the World Bank might be a good indication that the request could have been made by the bank itself. Another hint of this link can be seen on page 45 of the MOD which says that, "the Advisory Group recommended that the

two Centers undertake a thorough strategic planning exercise to address some of these deficiencies and strengthen the institutions" and it continues by observing that, "in February 1993, during a technical visit to Washington by representatives of the Brazilian government, the terms of reference for a strategic planning exercise for the two Centers were approved as a pre-investment study". The document continues by saying that, during that visit, it was agreed by the Brazilian and Bank team that, "because a strategic planning process can take a long time, only the most critical outputs would be expected for appraisal. These critical outputs were: (a) a clear definition of the institutional mission, objectives and research agenda; and (b) definition of an evaluation system for the institution and its staff".

Given the importance of the exercise made by that outside and international independent advisory group, I made several attempts both in Brasília and in Manaus to get the copy of the evaluation report referred to as Needs Assessment, produced by them. Numerous requests, and several visits, were made to the director of the Institute's office in Manaus, in an effort to obtain a copy of the document for my research, but the document was never released. The reasons for this concealment are far from clear.

The Institutional Strategic Plan is one of the first formal initiatives taken by the organisation at the begin the improvement process. As such, one of the aims of the strategic planning exercise would be to identify the Institute's capabilities and evaluate the extent to which it was able to achieve the aim. As part of those initiatives, the Institute initiated a process of internal evaluation and subsequently the development of the strategic planning exercise.

The main stages of the process of strategic planning at the Institute are described in an internal publication called *Relatório Final do Planejamento Estratégico,* which is a sort of Strategic Plan Report. The Strategic Plan Report was developed in 1994 to fulfil the requirements of the World Bank. Financial and technical support for the process of developing the institutional strategic plan was given to the Institute by the Brazilian Ministry of Science and Technology, the World Bank and with the assistance of two consultants from the São Paulo University Business School (*Fundação Instituto de Administração da Universidade de São Paulo*). It is

important to stress here that the Strategic Plan Report was a publication developed by the Institute itself whereas the MOD is a document produced by the World Bank.

Although the publication does not present a table of contents of the document, it is divided into nine sections. Those sections are: Institutional Group Participants, Presentation, Introduction, Methodology, Mission of INPA, External Environment Analysis, General Objectives, Internal Environment Analysis, General Conclusions and Recommendations.

The first five pages of the document (p. 3-8) present a list of the people involved in the elaboration of the document. The people listed as participants were classified into different groups which included two Planning Managers and eleven people who were members of the Technical-Scientific Committee. Among those who were members of the Technical-Scientific Committee, four were previously directors of the Institute and five others were researchers at the Institute. At an institutional level, there were fifteen participants who were heads of managerial posts at the Research Departments, and eleven held posts as managerial heads in the Administrative Departments. There were also another 61 participants, including researchers and technicians who took part in the planning process. In Chapter 3 (Methodology) more detailed information about the participants has been presented.

The presentation section of the document (p. 11) states that the Strategic Plan Report was developed from the results of a series of analyses and debates which occurred in 1993 in the Institute, having in view its consolidation as a Scientific Excellence Centre. The process involved around one hundred members of staff representatives of the different organisational groups. The document tried to define the institutional mission, objectives, priority research programmes and projects for the region.

The introduction (p. 15) presents a background rationale for the improvement process. It gives a global dimension for the environmental concerns surrounding the Amazon region, its environment, conservation and sustainable development and also emphasises the need for the generation of scientific knowledge about the region. The section explains that, in order to attend to the ever complex demands of the Amazon region, it is essential to make available a scientific and technological research infrastructure in accordance with the possible demands and challenges based on

centres of excellence of world class level. This would also imply giving the Institute institutional and administrative mechanisms to maintain it in that position.

The methodology section (p. 17-19) states that a participatory and systematic approach was used in the strategic planning exercise. It involved all staff, at different stages of the process, but the responsibility for the administration and control of the process was given to a group of representatives of the different organisational units of the Institute. In addition, external consultants were involved in providing guidance and advice during the planning and institutional analysis process. The synthesis of the methodological process is presented in the document in the form of a diagram, called *System of Planning, Monitoring and Evaluation of Science and Technology.*

The planning process involved the evaluation of the organisational units, demands, external environment, revision of the mission, definition of general and specific objectives, and research plans. The planning process also involved an internal assessment of the Institute which included both administrative and scientific analysis. The analysis of the scientific performance included the evaluation of research performance, development and results. In addition to evaluations through seminars, workshops, meetings and discussion, the internal assessment was also based on the use of questionnaires which were sent to all employees of the Institute. 311 employees replied to the questionnaire. The questionnaires invited the employees to give their analyses of, and suggestions for, the Institute, identifying both its strengths and weaknesses. After that stage, all the main categories were identified and each aspect was analysed and the most important issues identified in terms of urgency and in terms of the actual and the desired situation. This evaluation was conducted by the different Scientific Departmental Committees of the Institute and involved seventy researchers, chosen by their peers from all research departments.

It is important to make clear that the questionnaires used in the Institute's evaluation dealt only with administrative aspects. Scientific aspects were analysed differently, through the evaluation of research projects, performance and results.

The planning process also revised the organisational mission and resulted in a more contemporary definition which was intended to reflect the Institute's actual goals

without losing the original objectives set out at its inception (p.21). Accordingly, the Institute now has the aim to "generate, promote and disseminate scientific and technological knowledge about the Amazon for the conservation of the environment, and the sustainable development of its natural resources and utilisation of the knowledge for the benefit mainly of the regional population" (World Bank, 1994:46).

A section, *General Objectives* (p. 29-30), defining the main goals of the Institute, is part of the Strategic Plan Report. Those objectives are closely related to the institution's mission. Among these objectives are: generation and dissemination of technological and scientific knowledge, collaboration in the definition of regional development policies, development of its human resources, modernisation of its infrastructure, among others.

The fourth section of the document provides the analysis of the external environment of the Institute (p. 23-28). The analysis of the external environment includes two main aspects. The first is related to the general external environment and its probable future development while the second analyses the actual institutional structure.

In that sense, the analysis outlines areas of knowledge in which the Institute is currently involved and also areas of scientific activities in which it may have a future role to play. It also analyses alternative scenarios of what might happen in the future in the light of the present situation e.g. sustainable development and the rational utilisation of natural resources. The various options were analysed by evaluating their implications for the Institute.

As part of this planning process an institutional audit was carried out at the Institute (p. 31-42). This was based on the results of data collected through structured questionnaires that had been sent to employees, as well as on the outcomes of several meetings, seminars, workshops and discussions involving key participants.

The document points out that in the internal analysis of the performance of the Institute, internal factors were widely examined as well as the external environment in which the organisation operates. As such, the Institute's present and future

potential were considered along with the need for the Institute to attend regional demands.

The internal analysis described in the strategic plan document (p31-42), involved an assessment of the Institute's performance and structure, evaluating its capacity to achieve the intended goals. The analysis was divided in two parts. The first one concentrated on the analysis of research activities, outlining their main research projects and actions, scientific production and research areas. The second provides an administrative diagnosis of the organisation, based on the data collected in the structured questionnaires issued to employees.

The scientific analysis in the first part of the Strategic Plan Report notes that all research projects and research activities that had been carried out at the Institute in the previous five years had been registered. Taking projects and activities together, 87 were classified as basic research, 62 as applied research and 82 as both basic and applied research, which gives a total of 231 research projects and activities.

Considering the high number of projects going on at the Institute an analysis for a reorganisation of the projects was then developed. This scientific reorganisation was not developed at the same time as the elaboration of the strategic plan but at a later stage. At the time of the strategic planning elaboration, only priority areas for research and the definition of research programmes were identified.

The scientific reorganisation which took place later resulted in the development of a research agenda for the Institute (INPA, 1997). The Research Agenda is dated 1996/1997 and it is organised around nine programmes. The number of projects in each programme varies between one and twelve projects, according to the programme. As such, the Agenda contains 46 projects inserted into seven programmes in addition to the nine projects as part of the PPD (PPG-7) and one project as part of the Scientific Collections programme. Those 46 projects included at the Agenda are denominated Institutional Research Programme - PPI (*Programa de Pesquisa Institucional*).

The definition of the Agenda followed an internal discussion process which lasted around two years. As a result the Institute identified, from the 231 projects which

INPA was carrying out, those which were considered priorities. The Institute was made responsible for providing funding for the selected projects. The remaining projects which were not included in the Agenda became responsibility of individual researchers who would have interest in the project, and who would also be responsible for getting funding for them.

The Agenda gives the titles of programmes and projects, their objectives, people responsible and scientists involved on the projects, and provides an abstract of them. However, it does not give information on the length and period of the projects - essential information that would be expected to be found in a document like this. Strangely enough this could leave the impression that the selection of such programmes would constitute a set of continuous scientific activities at the Institute instead of a fixed research programme. There was no evidence of a new research agenda having been established at the Institute to continue the one designed in 1997. A managerial report published in 1999 still refers to the first edition of the Research Agenda as the main document which is used as the guideline for the scientific activities of the Institute (INPA, 1999).

As commented in a previous paragraph of this chapter, the reorganisation of projects and consequently the definition of a research agenda for the Institute was closely connected to a request made by the World Bank. The MOD (1994:45) observes that during negotiation for the strategic planning exercise, which occurred in February 1993, in Washington, the Brazilian Government and the Bank agreed that "because a strategic planning process can take a very long time, only the most critical outputs would be expected for appraisal". As such, it is pointed out that "the critical outputs were: a clear definition of the Institutional mission, objectives and research agenda", among others. Although it can be clearly observed the connection between the elaboration of the Research Agenda and that recommendation of the World Bank there is no evidence that there was participation of the Bank on the definition of the projects which were going to be part of the Agenda.

Returning to the Strategic Plan, the second part bases its analysis on an internal and external institutional assessment and provides a series of recommendations that it considers being fundamental to the desired transformation. Those recommendations

are related to research programmes, the Centres of Excellence Programme among others.

The strategic planning exercise presented in the document was an attempt to define the institutional mission, the objectives, the priority research programmes and projects for the region. It also tried to identify the mechanisms and the managerial and institutional requirements which would be essential if the intended changes were to be made in the Institute. The next stage, after the definition of the strategic planning, would be the implementation of its guidelines.

The World Bank's Memorandum Of Director (MOD) - 1994

The document, commonly known as MOD, is a World Bank document, which is part of the Pilot Program to Conserve the Brazilian Rain Forest (PPG-7), described in Report No. 12450-BR published in 1994. MOD stands for *Memorandum and Recommendation of the Director of the Latin America and the Caribbean Department I to the regional Vice President on a Proposed Grant from the Rain Forest Trust Fund to the Federative Republic of Brazil for a Science Centers and Directed Research Project – Phase I.* The document was submitted for approval on 27th June 1994 (World Bank, 1994).

The Science and Technology sub-programme of the PPG-7 is divided into two components: the Science Centers and the Directed Research Project. However, only the part relating to the Science Centers will be described in this section. The Science Center project is the formal programme which gives general guidelines to the process of transforming the Institute into a Centre of Excellence.

The MOD is one of the main documents setting the general guidelines for that improvement process at the Institute. The 93 pages document is divided into four significant sections: Background; the Project; Agreements Reached and Recommendations; and Technical Annexes.

One of the first pages of the document (p. i) gives the Grant and Project Summary giving summarised details of the grant awarding body (the Rain Forest Trust Fund – RFT), the recipient (Federative Republic of Brazil), beneficiaries (the Ministry of Science and Technology – MCT, National Institute for Amazon Research – INPA,

Emilio Goeldi Museum of Pará– MPEG, and Research Institutes and Organisations, Universities and Researchers). The total value of the grant from RFT for the project is around US$ 8.5 million. However that amount not only covers the Excellence Programme at the Institute but also includes investment for the MPEG, the Direct Research Projects and other more specific expenditures. More details about the investment and activities involved at the Science Centers Project for the Institute will be discussed later on this section.

The Background section (p. 1-6) is divided into two subsections, the Setting and Lessons Learned from Previous Bank Involvement. The first subsection is mainly concerned with providing background information for the project. Accordingly, it gives information on several aspects such as; the immense size and importance of the Amazon region; concerns about the use of inadequate technologies in the region; the need to invest in research; and the need to strengthen the research capacity of institutions located in the region. In addition it also gives brief information, for example, on science and technology funding in Brazil, the Brazilian government strategies for science and technology in the Amazon, and the institutional framework of scientific organisations in the region, and so forth.

One of the annexes included on the MOD (Annex 5 – page 56) also provides a background for the section entitled *Long-term Strategic Development of the Science Centers.* It states that:

> "the two Centers would provide an important logistical and infrastructural base for research, advanced training, and information collection, storage, processing, and dissemination that would benefit Pilot Program projects. The Centers will also engage in research activities that will support individual Pilot Program projects, and also function as a 'laboratory without walls', i.e., by co-operating actively with other scientific institutions in the Amazon region, in other regions of Brazil, and world-wide. Internationally, open Centers will better be able to ensure the quality of their research, its focus on Pilot Program objectives and the cost-effectiveness of the funds invested in them"

The above paragraph appears to suggest a more open position in relation to the development of scientific research. In this view, the Institute would serve as a base

for the development of knowledge in the Amazon. This idea seems to suggest more open free-trade in research through the Institute in the Amazon region, by liaising with other interested researchers across the world.

Another important point is developed in the last sentence of the extract. The sentence puts forward the view that, with the adoption of a spirit of openness, the scientific institutions should improve the quality of their research to a standard which would be more acceptable internationally. The wisdom of this view is not been disputed here, but it is important to note that it is a highly controversial one and could be interpreted as gross interference in a national institution by an international strategy.

The experience of the Bank with other projects and the relevance of them to the proposed project is outlined in the *Lessons Learned from Previous Bank Involvement* subsection. As the title suggests, this section provides some information on the Bank's experience of lending for science and technology development. Some aspects of the Science Centers project clearly contain activities such as the development of needs assessment, design of performance indicators and reviews, which are related to the experience of the Bank in other projects which involve institutional development.

The Project section (p. 7-17) is divided into nine subsections: Project Objectives; Description; Costs and Financing; Implementation; Sustainability; Benefits; Rationale for the RFT Funding; Environmental Aspects and Risks.

The objective of the project as defined at the Project Objectives subsection (p. 7) "is to promote the generation and dissemination of scientific knowledge relevant to conservation and sustainable development activities in the Amazon region". As such two general strategies were defined to achieve this aim. The first is to give support for a grant programme for funding research projects on a competitive basis in the Amazon region (the Directed Research component) and the second is to strengthen research institutions of the Amazon (the Science Centers component). It is interesting to mention that from the 23 projects granted under the Directed Research Component, INPA had got funds for nine research projects.

It is interesting to note that the Science and Technology component of the Pilot Program is divided in two parts and involves the funding of scientific research as

well as the institutional improvement. The idea of having an improvement programme on its own in a scientific organisation without a parallel effort to provide more funding for the development of research would not be an adequate strategy for the improvement of the Institute. However, the funding programme does not imply that the organisation would automatically receive more funding for the development of the research carried out there. As opposed to the Science Centers, where the investment is made directly to the Institute, the Directed Research Project involves the granting of funds on a competitive basis in an open selection.

An issue that is not discussed, either in this section or elsewhere in the report, is whether or not there are sufficient resources to achieve the specified aims. The Project Objectives read very broadly, and there is a lack of a more precise definition of what criteria would determine a successful conclusion to the project. The Objectives are not defined sufficiently clearly to determine whether they are practical or not.

The first part of the Project Description subsection (p. 7) gives details of the Directed Research component. In the second part of that subsection, information on the Science Centers component is given. It is observed that as far as the Institute is concerned the component would include six main activities. The subsection then explores further those activities and provides more information on what is involved in each of them. A brief summary of the activities included in each of them is described below, followed by Table 4 which sets out the activities and corresponding resources for INPA's project:

- Strengthen the institutional management and administration functions:

  This activity is designed to strengthen the overall institutional administrative and managerial functions. Several activities are subsumed in these functions including the implementation of a regular system of planning, monitoring and evaluation; the improvement of international and national scientific exchange and technical co-operation; the improvement of administrative procedures, including personnel and financial management and training for administrative staff; and the strengthening of a development office responsible for fundraising activities and to assure long-term support for the institution.

- Support the rehabilitation and expansion of research infrastructure and equipment:

  This item is intended to up-grade the research infrastructure and equipment of the Institute. It would involve the expansion and furnishing of laboratory space for the Aquatic and Ecology Departments; the expansion and furnishing of space for collections; the installation of fire control system in some collections and in the library; the improvement of collections maintenance and management; the modernisation and equipment of the library; the modernisation of computer network capabilities for researchers; the acquisition of boats and vehicles for field research; the rehabilitation of two existing floating stations; and the improvement, acquisition and refurbishing of research equipment and utilisation.

- Improve human resource capacity in scientific research and education;

  The fundamental premise for this item is that incentives must be created and applied on the basis of demonstrated performance in order to secure highly qualified staff. The activities in this section involved mainly the development of a staff performance evaluation system. That system would be used to award the different incentives such as: the development of an exchange program for researchers at the Ph.D. level to make them more competitive at the national and international levels; and giving support to INPA's graduate program by providing resources to students for field work and to complete their theses, by providing equipment, and laboratory facilities.

- Disseminate research results;

  This activity is designed to promote the dissemination and use of the generated research results, and includes the financing of leaflets and booklets, scientific books, issues concerning the institutional scientific journal, film/video, the consolidation of an in-house publication office and an international congress.

- Provide technical assistance in science and dissemination management (a component funded by the British development agency ODA);

  The activities involved in this component include the funding of study visits by senior staff and training course in science development; support for the production of promotion and dissemination materials; the provision, and training in the operation, of a CD reader, computer and abstract disks; and the provision of advice and training in developing information relevant to development.

- Provide technical assistance to the project implementation unit.

  This component is designed to provide support to the Project Implementation Unit (PIU) for technical services, including contracting procurement services and an external auditor and monitoring and evaluation support.

The activities included in the Science Centers Project, as outlined above, involved a wide range of activities within the organisation. The improvement and development of the Institute was, therefore, concerned not only with its scientific activities but also included developing the administrative areas, the infrastructure and equipment, as well as using incentives to retain qualified staff in the organisation. The project also supported investment in basic facilities at the institution, such as the sewage system, water, power and telephone system.

What is not made clear is how all these developments, however worthwhile, will actually significantly improve the performance of the Institute. Many of the investments in infrastructure, such as refurbishing laboratories and the installation of fire safety systems, may have an indirect long-term effect on quality but one which is difficult to measure objectively.

A series of tables including key performance targets is included in the last part of that document. It shows that the project intended to define targets and outputs for the implementation of the Science Centers Project at the Institute. More detailed information on the specific tasks involved in each of those six main activities, their aims, outputs expected and financial resources involved in each of them, as well as a timetable for the project, is presented in the form of a table in the end of the

document. A detailed description of the activities involved in the project is presented in the Appendix 2 of this thesis.

Throughout this section, we find that there is a lack of consideration of how many of the changes required can realistically be effected. For example, many of the changes suggested would require amending the way that INPA is administered, which in turn would require specific action by the Brazilian Government. There is no way of insisting that action, such as stating that funds would not be released until the desired changes had been made, can be enforced.

Table 4 will present, by activities, according to the 1994 World Bank report (World Bank, 1994), some information on the financial resources involved on Phase I of the project.

Table 4 – Activities and Resources for INPA project.

ACTIVITIES	COST US$'000	TOTAL COST US$'000	%
INSTITUTIONAL STRENTHENING AT INPA		**480.1**	9%
Planning and general institutional support	115.2		
Strengthen inter-institutional co-ordinating unit	62.1		
Strengthen administrative co-ordinating unit	144.3		
Strengthen fund-raising foundation and develop fund-raising capacity	158.5		
RESEARCH INFRASTRUCTURE AND EQUIPM. SUPPORT		**3458.4**	66%
Research infrastructure	1944.0		
Maintenance and management of collections	222.0		
Upgrading library	341.0		
Improve equipment utilisation and acquisition	100.0		
Modernise computer and network capabilities at INPA	500.0		
Improve transportation support	80.0		
Field research stations – floating rafts	33.5		
Field research stations – terrestrial field stations (ZF.2)	92.0		
Consolidate the engineering/maintenance co-ordination of INPA.	145.9		
IMPROVE HUMAN RESOURCES CAPACITY AT INPA		**528.5**	10%
Develop and implement a staff performance evaluation system.	0		
Scientific exchange and training	304.0		
Graduate program	224.5		
DISSEMINATION PROGRAMME AT INPA		**204.3**	4%
Dissemination of scientific information	86.0		
Extension programme	55.0		
Support an in-house dissemination unit	63.3		
POTENTIAL TECHNICAL ASSISTANCE FROM ODA		**385.0**	7%
Support for study visits and training courses in science development	60.0		
Advice on dissemination literature to promulgate.	150.0		
Provision of abstract databases and training	56.0		
Provision of advice/training in developing inform. from collections.	119.0		
PROJECT IMPLEMENTATION SUPPORT AT INPA		**200.0**	4%
TOTAL COSTS		**5256.3**	100%

Source: World Bank (1994).

The table above gives some detailed information on the budget of the Science Centers Project. The table relates to the activities involved in Phase I of the project designed to transform the Institute into a Centre of Excellence. The programme consists of three phases which are the Emergency Assistance, Phase I and Phase II. The investment in the Emergency phase is financed under a different contractual arrangement, while the financial resources involved in Phase II would be dependent on the successful implementation of Phase I.

However, the rigid planning that has taken place means that there is little room for flexibility, and for changes to be made as the project develops. Some contingency funding would have been useful to meet needs that were not apparent at the start of the project.

Table 4 notes that by far the biggest investment was made in Research Infrastructure and Equipment support items. This represents 66% of the total investment of the programme. The Research Infrastructure item of this component includes the construction and renovation of buildings, the expansion and furnishing of collections space and the installation of a fire control system. These improvements used up 56% of the total investment in that component. The Ecology Department's were greatly improved and the Aquatic Biology Department was going to be moved to an entirely new building.

The improvement of the Ecology department and the construction of a new building for the Aquatic Biology department resulted from the evaluation produced by the commission responsible for the production of the report '*O INPA como Centro de Excelência em Pesquisas na Amazônia*' (INPA as a Centre of Excellence in Research in the Amazon), mentioned earlier. This report presented the findings of an internal audit of INPA including a review of the quality of work of INPA's research departments. The MCT report identified those two departments as high quality at the Institute (INPA, 1993; World Bank, 1994).

The Aquatic Biology is one of the largest departments at the Institute and was previously contained in several buildings spread around the campus of INPA. Bringing it together in one building would greatly enhance the development of

departmental work and allow improved communication between researchers and a more integrated approach to work.

The second largest investment in the 'Research Infrastructure and Equipment Support' item is the Modernisation of Computer and Network Capabilities representing 14% of the 66% spending on that component.

A large concentration of resources is made in the infrastructure of the Institute. It could be argued that this investment could have been used more wisely on improvement initiatives that would be more likely to raise performance. What appears to be happening is that the funding from the World Bank is being used to maintain and upgrade INPA, rather than to improve the Institute's performance. While the Institute undoubtedly needs enhanced levels of maintenance, the funding for this should come from the Brazilian Government, rather than from the money provided by the World Bank.

The second largest element to be invested in the programme is the improvement of human resources at the Institute. The investment in this component includes the design of a performance evaluation system for the Institute's staff. But, although the programme stresses that the implementation of that system is important in order to apply different incentives based on the staff performance, no financial support is included for that specific item. The Institute at present has a poor system of performance evaluation of its staff, which is inefficient and does not allow management to give incentives or rewards for staff performance. More discussion regarding the Brazilian Government personnel system is presented in a later chapter.

Although the investment from the British aid agency Overseas Development Agency (ODA – now Department for International Development - DFID) is included in the budget of the project it is managed under different contractual arrangements, with the financial resources directly managed by ODA.

The total costs for the whole project (including the MPEG and the Directed Research Project) is estimated at US$15.1 million being US$8.5 million financed by the RFT, US$5.4 million by the Commission of European Communities (CEC), US$0.7 million by the United Kingdom, and US$0.5 million by the Brazilian Government.

The section concludes observing that "additional phases could be financed to support the long-term strategy as more funds are committed to the Pilot Program".

The Group of Seven (G-7), which is responsible for the PPG-7 funding, has chosen the World Bank to be responsible for the management of the financial resources of the Rainforest Trust Fund (RTF). The disbursement of the resources is bureaucratic and involves several government agencies before the resources can be made available to the Institute. The funding is made through the Agency for Financing Studies and Projects – FINEP (*Financiadora de Estudos e Projetos*) a Brazilian Government funding agency. After the funding is allocated at FINEP it is then transferred to the National Budget (*Orçamento da União*) and then allocated to the Science and Technology Ministry – MCT budget, which then transfer it to the Institute. As such the transactions are usually made via MCT. Previously the transfer of those funding involved even more governmental agencies. The transfer from FINEP would first be made to the Ministry of Environment and Legal Amazon – MMA (*Ministério de Meio Ambiente e da Amazônia Legal*) budget and only after that it would be transferred to MCT's budget. In order to simplify and speed up the process and make the resources available to the Institutions more quickly, negotiations between the MCT, MMA and the Budget and Planning Ministry – MPO (*Ministério do Planejamento e Orçamento*) took place in 1997. The negotiations led to changes which resulted in the resources for the project being transferred to MCT directly, without the MMA involvement (MCT, 1998).

Undoubtedly, these financial transactions were very bureaucratic. They involved a great number of people and documents which had to follow the fixed rules for authorisation and signature by the responsible person for each specific task. Furthermore, the fiscal year in Brazil runs from January 1 to December 31. In accordance with the government financial system, the budgets of government offices have to be used and accounted for by the end of December. This can cause constraints on the management and use of financial resources for public organisations. Although the changes described above on the transfer of budgets has simplified and speeded up the process of funds transfer, the Institute still experienced delays in the availability of those resources. This shows that bureaucracy rather than

formalism, is the difficulty in this area. Too many rules still delay payments, but when changes are made, the situation does appear to improve.

The subsection on Project Implementation (p. 11) describes the way the project would be administered, the monitoring and evaluation strategies, the dissemination details, and information on procurement, disbursement and auditing. The subsection defines that the project should be completed by September 30, 1996.

The Project Sustainability subsection (p. 15) observes that "science research investments in Brazil and particularly in the Amazon region, which remains poorly understood, will still be needed after this project". It continues, adding that "the long-term sustainability of the two research centers will be enhanced by diversification of funding sources, by support for greater autonomy for the Centers and by training staff in fundraising techniques, which would increase their capacity to attract outside funding after the project ends".

The document gives the rationale for the Rain Forest Trust Fund and also observes that no significant negative environment effects are expected as a result of the project (p. 16).

On the analysis of the project benefits (p. 16) the publication identifies environmental policy makers and educators in the region as more general beneficiaries of the project. As direct beneficiaries, the document identifies researchers from universities or from private or public research institutions, and other users of science. It adds that "by providing the basic infrastructure and equipment needed for scientific research, the Science Centers would attract scientists from other regions or continents and, with them, advance much-needed knowledge".

The main risk for the Science Centers Project is seen as the potential lack of continuity in governmental funding (p. 16-17). In order to minimise that it is suggested that a greater autonomy should be given to the organisation as well as the establishment of long-term funding mechanisms which would protect the organisation from financial uncertainties.

The section on the future funding of the institute is entirely inadequate. In Brazil, there is an imbalance in the funding of science and technology in the North, which

gets limited resources, because of the small number of efficient institutions there, and in the South, which does much better because most of Brazil's high quality research establishments, and most of the best scientists, are based there. There is no suggestion that this imbalance should be rectified, which would be one way of improving the institute's financial situation.

While the report recognises that the main risk to the project is the potential lack of continuity in government funding, it does not suggest how this can be dealt with. No commitments appear to have been sought from the Brazilian Government, regarding the long-term funding of INPA, although it is suggested that long-term funding mechanisms should be put in place.

The report's only significant suggestion as to what can be done to resolve this problem is to suggest that the Institute diversifies its funding sources and trains its staff in fund-raising. These suggestions, while potentially worthwhile, may well prove largely impractical for an Institute situated in a relatively poor area of a developing country. There are no recommendations on how substantial diversification could be achieved.

We can therefore say that one of the main failings of the document is that it does not deal adequately with the future of the institute, after World Bank funding stops. Although some helpful suggestions are made, they are not followed up, and it appears that the report avoids this issue, and simply hopes that the issue will resolve itself.

As far as that autonomy of the Institute is concerned, the MCT evaluation described in the report *INPA as a Centre of Excellence in Research in the Amazon* cited above (INPA, 1993) developed an internal analysis of the work of the Institute. As a result of that analysis, one of the proposals of the committees responsible for the development of that report, was the change of legal status of INPA from a Research Institute answerable to a government agency to an autonomous organisation directly answerable to Central Government. The proposal would mean that the Institute would be in the second level of the Government's hierarchy and hence it would give more autonomy to the Institute. However, the changes would only be possible through the signing of a Presidential Decree. This seemed to be a strong issue at that

time at both governmental and institutional levels. As such, the importance of that change to the legal status of INPA and its effect on the Institute is emphasised in the Report. The decree proposing the changes in the legal status of INPA was then developed. These changes have not yet been made and the Institute is still under the control of MCT.

The World Bank report observes that an earlier proposition for new legislation for research institutions was not pursued because of the complexities of changing legislation in Brazil. Because of the difficulties in changing legislation, it was agreed then that it was not essential to change INPA's legal status as long as MCT agree to continue to delegate to the Institute the necessary legal status and mechanisms for project execution. The Institute at present only has a limited delegation of powers and those should be maintained (World Bank, 1994). The World Bank's initial idea was to provide more flexibility to the organisation to implement efficiently the project which however was undermined by the limitations of the Brazilian bureaucracy. The World Bank did probably not insist further in the proposed changes on the belief that as long as MCT would continue to give enough flexibility to INPA this would then avoid major problems. These propositions give an idea of the extent of the changes initiated by outside intervention at the Institute and also show the intrinsic bureaucracy of the Brazilian government.

As far as the MOD is concerned, a great deal of information is provided in form of Annexes (p. 20-91). More details on the estimated cost of the project is given in schedule A and B. Schedule C provides a timetable of key project events. The annexes also include information on the description of the organisations and their main funding sources from 1981 to 1991. It also gives a summary of the Strategic Planning process of the Institute as well as further information on the long-term development of the Science Centers. It also includes tables with more detailed information on key performance indicators, objectives, activities, results expected and timetable for the project.

The document describes the project, the financial resources and sources involved and activities and performance indicators for the implementation of the project. As can be observed the project proposes substantial changes to the current state of the

Institute. This involves changes in its infrastructure, human resources, dissemination process, funding arrangements, and equipment, for instance. By far the biggest investment shown on the Activities and Resources for INPA Project table is made in infrastructure and equipment which is around seventeen times as big as the smallest investment which is in the 'Project Implementation Support at INPA' activity.

The project, therefore, intended to make changes in the research infrastructure of that Brazilian scientific institution. The initiative was thus a sign of significant intervention by outside institutions in the Institute. As part of a broader programme, it also involves changes in the way scientific policies are run at the Brazilian government level after changes are made in the way scientific activities are run and managed within the organisation. These structural and internal policy changes often occur in the implementation of World Bank projects - a fact also noted by other authors. Burnell (1997:193) for example observes that

> "the World Bank's focus on governance prioritises reform of the public sector, for increased efficiency and effectiveness and reduced corruption"

In this part of the thesis I concentrated on providing some information specifically on the general design of the strategic plan and on the MOD document. Although some analytical comments are made in this chapter, more comments and an examination of the institutional exercise with views from respondents is provided in Chapter 5.

The definition of the sub-programme Science and Technology (in which the Science Centers component is inserted) is based on the strategic planning. The general guidelines and strategies for the implementation of that sub-programme are defined at the MOD. Although some organisational documents treat the implementation of the strategic planning and the Science Centers component of the PPG-7 as two separate activities, the elaboration of the reports of the Science Centers (Excellence Programme) follow the design proposed by MOD.

The development of the strategic planning exercise was financed under different contractual arrangements from the Science Centers Project. It is also interesting to note that at an organisational level there are even two different departments at the

Institute which are responsible for the "implementation" of each activity. The organisational unit responsible for the implementation of the Strategic Plan is the Department of Planning. On the other hand, the organisational unit responsible for the management and control of the activities involved in the Science Centers is the sector called PIU – Planning Implementation Unit (*Unidade de Implementação de Projeto*). The organisational unit is usually known by its English acronym (PIU) both inside and outside the organisation. That section is directly linked to the director of the Institute. This set up follows a recommendation of the World Bank during negotiations for the project. That section and its manager would be responsible, at the Institute, for the implementation of the project, for the attainment of its objectives and of the expected outputs (World Bank, 1994).

The organisational unit at the World Bank responsible for the internal management of the PPG-7 is the Environment and Agriculture Operations Division, of the Country Department I, which is part of the Latin America and the Caribbean Regional Office.

Table 5 compares the differences between the Strategic Plan and the MOD document on the most important variables they covered.

Table 5 – Comparative variables between the MOD and the Strategic Plan

VARIABLES	MOD	STRATEGIC PLAN
Authorship	World Bank	INPA
Date of elaboration	27, June, 1994	1994
Length of the programme	30/09/96	Not defined
Kind of document	Project type	Report type
Funding for the document	World Bank	MCT and World Bank
Main participants	World Bank staff ODA representative USAID representative	INPA's managers, researchers and employees Consultants
Excellence theory	None	None
Guidelines	More specific information	General analytical information
Objectives	Strengthen research institutions of the Amazon Recommend the project to the World Bank	Define the general guidelines and institutional and managerial mechanisms to the improvement Identify and evaluate INPA's capability Define INPA's mission Define priority research programmes
Items analysed/included	Background Project objectives Project description Costs and financing Implementation Environmental aspects Benefits Risks	Organisational units Demands External scenarios Mission Research programmes/projects Internal administrative analysis Scientific performance
Methodology	Not defined	Seminars, workshops, meetings, discussion, questionnaires, etc.
Activities involved/ Recommendations	Strengthen the institutional management and administrative functions Support the rehabilitation and expansion of research infrastructure and equipment Improve human resource capacity in scientific research and education Disseminate research results Provide technical assistance in science and dissemination management Provide technical assistance to the project implementation unit	Definition and implementation of a research programme Development of the institutional capacity to getting funding Strengthen the international co-operation unit Strengthen the planning department Strengthen the administrative department Strengthen the institutional "town hall" and infrastructure and equipment
Identification of customer	Environmental policy makers Educators Outside researchers Outsider users of science	Not defined
Main risk	Lack of continuity in governmental funding	Not defined

As can be observed from the table above, the Strategic Plan Report sets more general guidelines, policies and possible strategies for the definition and design of the improvement process than the MOD. As a result, the strategic plan describes, in a more general and analytical way, the Institute's activities, performance and possible alternatives for improvement. The reason why it does not present many specific guidelines may be because it was developed in the early stages when there was not much definition of what the improvement process would consist of. As such, the organisational analysis of the institution lacks more clearly defined strategies for the improvement of the Institute.

On the other hand, the World Bank document gives more specific objectives, guidelines, outputs, and performance indicators. In that sense, the MOD document sets out more clearly the expected results from the Institute. The document was defined after the strategic plan of the Institute, once it presents on page forty five of thc MOD a section headed Progress on Implementation of Strategic Planning.

Although the INPA's document is presented in an analytical form, its information is given in a less precise way than the World Bank document. The World Bank, for instance, observes that the strategic planning exercise of the Institute should identify the competitive position of the organisation in relation to other similar institutions. Then, the institution would concentrate on programmes in which its competitive position was strong and strengthen or eliminate its areas of weakness. The rationale for that option would be that there is a limit to the number of activities in which an institution can achieve excellence especially when financial resources are limited. However, although recognising it as a difficult issue to tackle, the MOD document observes that this strategic option has not yet been addressed by the Institute.

This strongly suggests that the World Bank's view was that the Institute should concentrate on, and invest in, the most efficient areas and either strengthen or leave those which are not as productive. This example of addressing that scientific option at the institution may also gives a broader and more strategic vision of that outside agency in relation to the Institute's activities. The recommendation to identify some strategies in the Institute in a more detailed and critical way might reflect the experiences of the World Bank with projects' definition and implementation, and investment in other

institutions and countries, a skill which may not be found at the Institute. With an outside perspective, the Bank may have a broader vision of the organisation than does the staff of the Institute, who are more involved in its day to day activities.

Conclusion

The primary purpose of this chapter is to provide background information about the improvement process going on at the Institute as well as to analyse the documents which describe how the improvement process at the Institute will be carried out. There are two main documents which govern the improvement process. These are the *Strategic Planning Final Report* (or *Strategic Plan*) which was produced internally at INPA, following consultation with the Institute's staff, and the *Memorandum of Director* (MOD) which follows on from the INPA document, but was produced by the World Bank.

The *Strategic Plan* is divided into nine sections, which analyse the situation at the Institute and the changes required in the Excellence Programme. While some steps in the production of these documents have been taken which could improve the chances of success of a quality improvement process, such as consulting widely with the Institute's staff, clarifying the objectives of the Institute, and prioritising the work done by the Institute, there are obvious flaws in the document which will impact on the success of the improvement process.

The criteria for deciding priorities, for example, are unclear, and there is no indication that the resources required to complete the priority projects have been assessed or will be in place. It is also not clear how effective the consultation process with the employees will be. However, the final document governing the improvement process will be the MOD, produced by the World Bank having seen the Institute's views in the *Strategic Plan*. The World Bank should be in a position to address those flaws which could potentially seriously disrupt the improvement process.

The Memorandum of Director is divided into four sections: Background, The Project, Agreements Reached and Recommendations, and Technical Annexes. It describes what exactly will be done to improve the Institute throughout, and provides details of the

budget available, and the changes that will be required. It does however suffer from several serious difficulties.

Throughout the document, there is no explanation as to how the actions taken will improve the Institute. Sometimes this is obvious, such as in acquiring vehicles for field research, but other items are less clear, such as providing more space for collections, refurbishing laboratories and installing fire control systems.

The most serious problems, however, come with issues that have not been addressed satisfactorily. For the improvement process to work, there is a need to set up the Institute with the correct structure, and the resources required both to operate the structure and to carry out the research. These questions are not dealt with in nearly enough detail, and there appears to be merely a hope that things will be resolved satisfactorily.

The first difficulty is that of the legal structure required for the Institute. The MOD report recognises the need for autonomy from the Brazilian civil service structure, but does not guarantee this will be achieved. No law has been passed which would create this autonomy, and the preferred route is through a decree of the President, transferring control of the required functions to the Institute. This decree was never made. In addition, if the Institute were to become self-administrating, it would need high quality staff to do this, and improve the standard of administration. No mechanism for achieving this was suggested.

The second serious difficulty is that of resources. When the World Bank resources stop, as they must inevitably at some point in any such project, there is no guarantee that the Brazilian Government will fund the Institute adequately to enable it to preserve the gains made, and to advance further. Nor is there significant development of the idea of obtaining funding from other sources, which is mentioned as a way round any potential difficulties.

Also, neither documents specifically talks of the dangers of formalism, which must be a problem particularly in the administrative structures of the Institute. Any quality management approach which will be fully successful in the context of a developing country must have a clear strategy to minimise the effects of formalism.

We can therefore see that, although there is much good work in the programme and in both these documents, there are serious difficulties and questions which must be answered if the improvement process is to produce the results required of it. Future chapters will reveal more of the practical impact of these points on the improvement process.

Chapter 5 - Evaluating the Excellence Improvement Process

Introduction

The process of improving the Excellence of the National Institute for Amazon Research (INPA) will be analysed in this chapter, using primarily the interviews with people in Brasilia and at the Institute, although other relevant material will also be used. This analysis will be based mainly on the data collected during the fieldwork and is largely confined to the issues most frequently mentioned during the interviews. The role of the international organisations involved in this study and the perceptions of the representatives of those international agencies, will be analysed in Chapter 6 from data gathered from the interviews with them.

Presentation and Discussion

Participants

While Chapter 6 will present the views of the representatives of the six international organisations contacted, this chapter is going to give the views of three officials of governmental agencies in Brasilia, whose work involves close contact with the Institute, working in the Ministry of Science and Technology and Ministry of Environment. It is also going to present the views of the people interviewed at the Institute, in a total of 23, which included the top and middle managers, researchers and technicians of the administrative and research departments.

Managerial Aspects

The starting point of my research into the Institute's management was the role of the director. Many of my respondents commented on the importance of the post and the impact of the personality of those who had held it. The director's role is likely to be

particularly important in an organisation where an improvement process has been taking place and I wanted to explore the role of the director, in particular, Ozorio José de Menezes Fonseca, who was responsible for the management of the Institute at the time of my fieldwork, and who was responsible for taking forward the Excellence Programme.

The post of the director of the Institute is set as a fixed term appointment. In this case the director stays on the management of the Institute for 4 years. Accordingly there is a common process at the organisation for electing new directors. This process usually consists of an internal election where the 3 most voted names are sent to Brasilia and the new director is then chosen, in this case by the Minister of Science and Technology, to whom INPA is subordinated. More details about a recent experience of the Institute in the election of a new director are going to be presented in Chapter 7.

The management of a research institution has to deal with both administrative as well as scientific aspects of the organisational management. The different demands of dealing with administrative, scientific, and political issues on the development of the tasks involved in the day to day activities of the post of top management is extremely challenging.

Thus on that organisational change, the managerial approach of the management of the Institute has been investigated. The process of organisational change started at the Institute in the early 90's during the administration of José Seixas Lourenço. That director was at the Institute from 1992 to 1995. Seixas Lourenço has a scientific background with a PhD in the University of Berkeley, in the USA.

In 1995 Ozorio José de Menezes Fonseca was designated the director of the Institute. He was previously the director of the General Research Department, an organisational unit in the Institute responsible for the co-ordination of all research departments. Ozorio Fonseca is a scientist of the Institute and he has got a PhD from a Brazilian university in Ecology. One of the main roles of Ozorio Fonseca was to carry out the implementation of the Science Centers project, which had its early stages in the administration of Seixas Lourenço. Another influential director which is

going to be mentioned in this thesis was Warwick Estevam Kerr who was in the management of the Institute in the 70s, and has now been once more the director of INPA.

It is important also to note that the freedom of the director has been limited by the activities of the World Bank and the Brazilian government. Both these organisations exercise a supervisory role in the implementation of the Excellence Programme, and the director is obliged to take this into account when he is running the institute. Funding from the World Bank is also contingent on satisfactory progress being made, and this therefore places the World Bank in a position of considerable influence. This is something that was resented by several staff, as an infringement of the Brazilian sovereignty of the Institute. For example, José says:

> "I think that an internationalised Centre of Excellence certainly will not be to the advantage of the Amazon population, nor Brazil. So this Centre of Excellence would certainly not be a Centre of Excellence for the region, we need to see how things go and where it goes to, and the influence it will have to the Brazilian side. It could be the case that this international co-operation can be of some advantage, but this is not what has been observed so far"

Nonetheless, the director is still left with considerable freedom to run the Institute as he sees fit on a day-to-day basis, within the broad restrictions imposed by the Brazilian civil service structure. The perceptions of the managerial approach of the Institute were expressed with different views by respondents during the interviews. On one hand, some of the respondents had identified some positive indicators of the management style, such as: dedication to the implementation of the Science Centers project, investment in the development of human resources and infrastructure. One such example may be observed in the next extract, by Francisco, a junior researcher:

> "I think the direction of the Institute is concerned about all the problems of the Institute, it is concerned about the research agenda ... whether it is working, [also] with the implementation of the Science Centers project, the infrastructure, human resources development, ... projects, improvement of zoological collections... I think that the focus of

> attention of this direction is very broad ... There has been a lot of work in terms of improvement of the infrastructure, buildings everywhere, changes in the sewage, power and telephone systems. Everything was damaged, everything was deteriorated"

Additionally, some respondents pointed out that the management approach is characterised as democratic, as can be observed in the view expressed by this technician working in the administrative area called Manoel:

> "he is the kind of person who has a lot of meetings ... with the research managers ... he usually has meetings with the other managers as well, and asks us to pass the information to other staff in our departments"

On the other hand, other respondents expressed the view that the management style is centralised, lacks efficiency on the managerial posts and lacks leadership. Fabricio, a junior researcher, observes that:

> "the director has been developing good work ... however, in relation to his management style I personally think that he is often surrounded by advisors who are not competent ... and I think that the first thing that a manager has to do is to have extremely competent advisors. In addition, I think the Institute has started to become very enclosed within itself, and I think that in the region our role is bigger than what we have ... we have a chance to really make changes, given the knowledge that we have generated, on important issues related to the region ... there are so many decisions that have been taken so fast, like the state policies which interfere with the natural environment, which may make it change and will result in environmental disasters for instance"

When expressing his view about the management style of the direction of the Institute, José, a senior researcher, observes that:

> "despite the fact that it gives the appearance of a democracy, actually the management style is closely connected to the personality of the senior manager, and the senior manager is a person who likes to centralise, so the style is very centralised"

The organisational structure of the Institute has advisory committees at different levels of the organisation. There are committees at the top management level as well as those linked to scientific department levels. The committee located at the top management level is usually responsible for broad scientific and political questions which concern decisions regarding the whole organisation. On the other hand, decisions taken in the committees located at the research departments are more related to scientific and administrative issues regarding those specific departments to which they are linked.

While some of the broad decisions are taken by the top management committee, which also acts as an advisory body for the top manager of the Institute, most of the general managerial and administrative decisions are taken by the director of INPA. Despite these forums where decisions can be discussed in a more democratic way, the comment expressed by José seems to emphasise the centralised style of the management of Institute.

While there is some dissatisfaction with the way that the director operates, there is also a degree of support for him. Of the seventeen relevant interviewees, five voiced supportive opinions, another five were neither supportive nor critical, and seven criticised the director to varying degrees, as it can be observed in the next table.

Table 6 – Management style perceptions

	Criticism	**Support**	**Neutral**
JUNIOR	4	1	2
SENIOR	3	3	2
ADMINISTRATIVE	-	1	1
TOTAL	7	5	5

While the management style may be overly centralised, it does not appear that this has made the director markedly more unpopular than might be expected from a person in his position. It is also worth noting, that although most of the people

interviewed occupy managerial posts at the Institute, the choice of people to occupy most of the posts, especially those located in the research departments, is made through an internal election by their peers.

An interview was carried out with Ozorio Fonseca, who was director of the Institute at the time of the fieldwork. According to him one of the main goals of his management would be to have in a period of 5 years all researchers at PhD level. He states that:

> "the main goal of my management is that in 5 years ... INPA is going to have 100% of people with doctorates. This is a goal which needs to be met to achieve excellence, or at least it is a possible utopia, a goal to be achieved"

On the one hand this might show a great concern for the organisation's human resources development. However on the other hand it seems to be important in a research institution having scientists at different levels of their careers which may generate a more stimulating environment. In addition, this would be a goal which probably needs to be analysed more strategically. This means that either strategic areas at the institute need to be selected and investment on human resources directed to those ones which are stronger in the organisation in terms of scientific qualification of its staff and scientific production. Or alternatively investment should be directed to those areas that are important strategically but do not yet have a reasonable number of qualified scientists. Investment in human resources would thus be a way to improve their performance. In summary, that is an aim that needs strategic analysis otherwise there would be a risk that they would be directing investment to all areas of the organisation without a careful institutional evaluation.

However, given the present qualification of the Institute's staff, where in 1996 the number of people with PhD's was 99, in 1998 the number of researchers with PhD was 102 of a total of 227 researchers and 22 researchers were still holding only first degrees, it would be highly unlikely that this would become a feasible goal.

Also, by defining improving the educational qualification of the research staff as being the main goal of his directorship, the director seems to be marginalising the Excellence Programme. The project does not demand this change, and by stating that it is essential for excellence to be achieved, Ozorio Fonseca appears to be suggesting that he does not believe that the Excellence Programme will deliver excellence without other changes being made. While it is normal that the director would wish to work to improve the Institute, the weight that he places on this point would seem to cast doubt on the degree of his commitment to the Excellence Programme.

While defining as a priority investment in the institutional scientific community Ozorio Fonseca explains that:

> "[in improving] the infrastructure of the research, the physical infrastructure, I mean, to provide the infrastructure of the Institute with laboratories, adequate structure, human resources development for scientific as well as administrative areas ... this all means that, with the research better structured at the institution and the administrative personnel more qualified to attend the administrative and bureaucratic demands of the scientific research, you will have more possibility of getting funding outside the institution"

Ozorio Fonseca seems to emphasise that a better organisational and scientific structure of the organisation would be a way to obtain more financial resources for the Institute. The director stressed that in improving the infrastructure and the human resources of the organisation the chance to get more funding from external organisations would be greater. However, he seldom mentions interaction of his management with other local organisations, like the University, local government and funding agencies. A closer integration with these organisations would probably increase the possibilities of the Institute to get more funding.

The former director of the Institute seemed to have a more outward looking management approach. This may be observed in his interaction with external organisations. The management style of Ozorio Fonseca may be characterised as having a more inward looking and centralised approach.

Organisational change usually requires strong leadership and management that may promote internal interaction and which may generate the motivation for changes. The involvement of the management would need to be done also with external customers. It would be also important that the institutional management would have ability to conduct those changes satisfactorily both strategically as well as politically. The lack of leadership and those managerial characteristics was sometimes pointed out as constraints to the organisation to achieve those desired goals.

Investment in Science and Technology

Given that the Institute is a research organisation, it is important to discuss investment in science and technology in a wider perspective. Although the investment in Science and Technology from the Brazilian Government seems to be one of the best in Latin America, investment in this area is not as high as in industrialised countries. Chambouleyron (1999) presents a critical view arguing that Latin American generally treats science as curiosity. He then gives some reasons which may be counted for the small production of knowledge in Latin America. Investment in education in most of the Latin American countries is not as high as in more developed countries. Brazil particularly has many deficiencies in its education system. As a reflex of this lack of investment in education a significant number of the population is illiterate. One of the reasons for the low production of scientific knowledge may be that our education system, particularly in Brazil, does not give priority for science education and not much emphasis is given to scientific development. He points out that one other reason may be that:

> "Latin American politicians rarely have a clear understanding of the role that science and technology plays in the modern world: these are simply seen as parts of the political game ... The commitment of those in power counts for more than professional expertise when it comes to both research funding and appointment to decision-making positions. As a result, research activities are plagued by disruptive political instabilities. Funding is not only scarce, but poorly distributed and badly spent:

> programmes are established without clear scientific objectives and money is given to researchers who lack the right scientific background"

The author observes that this pattern may be observed in most of the research institutions in Latin America which seem to express a belief that Latin America does not need a scientifically literate population but only a limited number of top scientists. This is also reflected on research agendas and budgets. This situation usually supports development of advanced projects without thought for the limitations of local expertise and industrial infrastructure, leading to frustration and wasted resources.

If on the one hand investment in research should come from the government of the countries, on the other hand organisations should not be dependent only on government investments for the development of their scientific research. One of the dangers of the fact that Institutions become solely dependent on government investments may be a constraint in their scientific production, due to the fact that this funding may become scarce and irregular, especially in Brazil.

This is illustrated by the following comment made by Pedro, a junior researcher at the Institute, as he observes that the Institute should not be dependent only on government money:

> "not only the money coming from the government, because that sort of money will be harder to get, more scarce and distributed in instalments. Thus, it is a matter of going after the resources."

Another interesting point is that there are significant differences in the number of scientists, Institutions, postgraduate courses, and especially funding for scientific development for the different regions in Brazil. Institutions located in the south east of the country usually have a better structure for scientific development and a higher concentration of scientists. Although these differences have been a theme of debate in the scientific community, at the government level efficient strategies have not been defined to change this situation. Pedro considers that more investment in Science and Technology is needed and a policy differentiated from the North region

should be defined in order to minimise those differences and promote this strategic region. He adds that this change should not be only discussed but resources should actually be allocated at the government budget.

Perceptions about the Quality Improvement of the Institute

This section investigates the participants' perceptions of the improvement process at the Institute and, more specifically, on the idea to transform the institute into a Centre of Excellence. The replies of the participants on their perception of the initiative to transform the Institute into a Centre of Excellence basically fall into four groups ranging from those who were more enthusiastic about the idea to those who expressed doubtful or critical views about the project.

An enthusiastic view was expressed by Marcos, the manager of the Excellence Programme at the Institute, located in the administrative area of the INPA, who states that:

> "I think that considering an international perspective, with this 'globalisation', this kind of research to survive it has to become a Centre of Excellence ... or be connected to one. Because get funding is becoming more and more difficult, you have to compete in the market, and to compete in the market you have to be good otherwise you are out ... it has to be, INPA can't help ... it has to be a centre of excellence, *it has to be*, otherwise it doesn't survive"

The respondent stresses that the process of improvement of the Institute is of fundamental importance given the difficult that might be experienced in relation to getting funding for research for institutions which are not efficiently competent or equipped to perform well.

The view that the project is an important undertaking has also been expressed by a significant number of respondents, totalling eight senior and one junior researcher as well as one person working in the administrative area of the Institute. An influential comment is given by Mauro, a senior research, who observes that:

> "I think that is an important idea, because INPA is the biggest research institute of the Amazon. So there is a geo-politic importance, for its location ... for the importance of the region in relation to its bio-diversity. Because the Amazon region in addition to its mineral resources its main resources is its bio-diversity. INPA operates in an immense geo-graphical area with all these natural resources which are not well researched. I mean, Brazil as a nation needs to study better these resources and it needs to improve the infrastructure and the human resources of the region, needs to empower a centre of studies which supply this need of greater knowledge of the amazon region ... it doesn't mean that INPA is going to cover all the areas of knowledge, but we define what are the most important areas to the Institute perform, and really qualify the human resources and, provide equipment. Qualify administratively and scientifically, with good remuneration. If it doesn't qualify and give all conditions to develop the work, [it may] qualify its staff and this people get expertise, prestige and scientific independence and ... it risks to lose those competent staff to other institutions which didn't invest as much in them but can pay better salaries so INPA suffer a great loss"

The view of Mauro seems to express the general comments made by respondents. The issues raised by him in relation to the importance of the Institute in the region, and the need to develop more scientific knowledge was also emphasised during the interviews in relation to this issue.

For some of the respondents, although welcoming the idea of improving the Institute, they did not express their view too enthusiastically, as we can observe in the next extracts:

> "to me it is a dream to see INPA as an Excellence Centre, because it lacked all the things that have now been placed in a way" (Pedro, Junior Researcher)

> "to become a Centre of Excellence we still have to improve a lot" (Rosa, Administrative Area)

> "I believe it can become [a Centre of Excellence] but only in a very long term" (Gisela, Senior Researcher)

Although some of the participants of this third group expressed the view that the Institute seemed to be seen as a reference centre in some areas of knowledge, other stated clearly that there is still a lot of effort to be made in order to transform it in a centre of excellence.

Some criticisms in relation to the improvement project at the Institute were also made by respondents. More explicit critical views were provided mainly from junior researchers. An influential comment was made by Ricardo, a junior researcher, who observed that:

> "I remember on the time of the beginning of the strategic planning that the only thing that was talked about was transforming INPA into a Centre of Excellence, and I have always thought this term extremely inappropriate, first of all it has an elitist notion, secondly it does not say much, excellence for whom, excellence for what, excellence where, excellence how. There are a lot of questions that don't have answers, and along the planning process and in some documents of the G-7 ... the Centre of Excellence always comes up but it is never said what should be a Centre of Excellence in research in the Amazon. And then there can be a lot of different philosophical thoughts ... what and how we are going to research? Are we going to research at the Amazon, about the Amazon, or to the Amazon? Each alternative can have different strategies and results. So if the G-7 intention, with all the support it has been giving, is to form researchers that produce results to supply the industrial parks of richest countries, that is a kind of excellence. If it is for us to learn how to manage our natural resources, control what there exist and learn how to exploit it, that is another strategy, [it requires] other kind of research. Thus this is a question which is not clear at the Institute, and it wasn't made clear until now"

The respondents expressed some criticisms regarding the aims and strategies of the Centre of Excellence which, according to them, are not clearly defined at the

Institute. In addition respondents have also presented quite sceptical views about the investment. Some did not believe that the project was going to make a real impact in the performance of the Institute whereas others pointed out that the administrative policies of the Brazilian government were a great constraint to the management of the Institute. Sceptical views were also related to the fact that it was not made clear why the investment has been done, and if it would bring real benefits for the region.

The fact that it was not clear the reasons behind the foreign investment in the region was a concern clearly expressed during interviews. Although this might represent a nationalist view of participants this may be a result of previous experiences of exploitation in the region and even in relation to scientific activities. This is certainly a highly controversial issue which is not easy to be managed and controlled.

Table 7 presents a summary of the participants' perceptions about the idea to transform the Institute into a Centre of Excellence and the issues that they raised.

It is interesting to observe that on the one hand the great majority of respondents emphasising the importance of the project were senior researchers, but on the other hand the number of senior and junior researchers who shed some doubts on the project was similar. It means to say that a higher number of senior researchers expressed supportive views in relation to the Excellence Programme whereas a similar number of both senior and junior researchers compose the group who was doubtful.

Table 7 – Perceptions of the Excellence Programme at the Institute.

	ISSUES STRESSED	SENIOR	JUNIOR	ADMINIS TRATIVE
ESSENTIAL	Funding	-	-	1
GOOD	Last tropical forest in the world Great biodiversity of the region Need to develop more research Biggest institute in the Amazon Attend demands Study sustainable development Another source of funding Need to improve infrastructure Need to qualify and remunerate its staff	8	1	1
UNCERTAIN	The infrastructure needed to be improved (power supply, telephone services) The construction of buildings, had to be done. there is a lack of raw material in the planet. There are important active biological principles It is not clear what is wanted in exchange for that investment. Should contract younger scientists Provide structure to work Some people without competence Should dismiss people Hard to be excellent without salaries. Need to develop human resources More autonomy Uncertainty of resources	3	3	1
CRITICAL	What a Centre of Excellence in research in the Amazon is? This term is extremely inappropriate, it has an elitist notion, Excellence for whom, for what, where, how There are a lot of questions that doesn't have answers. To whom this centre will be for? There is a lot of interest behind this It will not search the advantage of the Amazon population, nor of Brazil. There is an investment because the rich [countries] are interested in the Amazon. This is just one investment, it is not continual. There is a lot of money, but it does not solve all the problems, not in research terms. I do not see this CE like a miracle that will change everything. the inefficiency is the common place when the job cannot be lost. The impediment to contract, that does not allow a renovation of the personnel.	1	2	-
TOTAL		12	6	3

This section has presented the perceptions of respondents in relation to the project to transform the Institute into a Centre of Excellence in research in the Amazon. While some participants have been enthusiastic about the idea some have been sceptical and presented criticisms about the process. The next section discusses more issues involved in the improvement process of INPA.

Views on Restructuring

As a perspective to be transformed into a Centre of Excellence in this specific area, INPA started to develop a series of activities in order to identify the Institute's potential and necessary requirements to achieve this goal. These initiatives were the start of the development of an organisational analysis which originated the institutional strategic plan. This plan which is outlined in the Strategic Planning Final Report, elaborated in 1994 and described in more detail in Chapter 4, defines the general research programmes, and is also supposed to define mechanisms and managerial and institutional requirements which would be necessary to make the intended changes in the Institute. In relation to changes that needed to be made in the organisation Marcio, one of the governmental officials explained that:

> "it is not possible to change an institution if you don't make people think differently in the institution ... so we have started trying to raise this awareness in the researchers of INPA ... so the first thing that had to be done was to change this conception .... there wasn't an institutional organisation, each researcher defined the line of research he wanted, depending on his individual interest. Today after a great deal of work ... people's ideas have changed. It is not easy to change, you don't change overnight ... so things have already been changing, and of course nothing can be forced to change, you have to convince and people have to convince themselves that things have to be changed"

As noted in Chapter 4, neither the World Bank's formal programme (Science Centers project), as set out in the Memorandum of Director, nor the institutional Strategic Plan offer detailed strategies for improvement of the quality of the

organisation. Other internal or external documents related to the Excellence Programme also do not address the strategies or the ideology which would give guidelines for the improvement of the institutional performance.

At that time the plan was being elaborated an institutional diagnosis was carried out at the Institute. According to the methodology section of the document the planning process was conducted in a participatory style which involved all staff, in the development of some stages. However a group that consisted of representatives from several different components of the Institute, was made responsible for direct control of the process (INPA, 1994).

Although the development of the strategic plan appears to have been the result of a participatory process it was sometimes suggested during the data collection that it involved only a small number of participants. It was also pointed out that in the process there was not a fair representation of the employees.

It could be observed that some of those objectives defined in that document seemed to be closely related to the Excellence Programme. A clear example of that is defining the modernisation of its infrastructure as one of the organisational objectives.

The internal analysis described in the strategic plan document involved an assessment of the Institute's performance and structure, evaluating its capabilities to achieve the desired goals. The first part of the analysis concentrates on the evaluation of the scientific research activities, their main research projects and actions and scientific productivity. On that subject the director of the Institute explains that:

> "for INPA to really restructure itself, in order to get this new form of organisation, it was necessary that in the previous management ... INPA went through a long process of internal debate ... INPA had around 215 researchers and around 230 research projects, this is something impossible to control. The strategic plan consolidated an institutional research agenda ... so it was possible to reduce the institutional research projects to 46, the idea is to reduce this number further, which is still big. Some [projects] show a duplication of activities which can be

> consolidated into a single project, so the resources can be directed to more objective and pragmatic projects ... this has changed completely the organisation of the Institute and its way of doing research. It has promoted a better interaction between groups, and it also facilitated the formation of extremely competent groups. This was not possible when we had knowledge and activities at INPA so spread out. This important change of internal organisation resulted in more competently performing research group"

Although the director states that a new form of organisation was implemented another view is given by Carlos, a senior researcher working in the administrative area of the Institute who worked on the definition of the strategic plan. He points out that:

> "now we have projects at the Institute within clearly defined programmes ... [we are now] working a little bit closer, we should work even closer and more connected but we are still not working like this yet ... We would need to have internal collaboration from people so they can see that the institution is bigger than INPA. There is an attempt to broaden this awareness. If the institution start to design a product for the society, by whom we are funded, then the researcher who is looking in his microscope will get a better feedback, but they are not used to changes"

The researcher mentions the fact that although a reorganisation of research programmes has been made they are still not working in a more integrated way. Thus it can be implied that the Institution could not make many changes to the organisation of the research projects being carried out at the Institute. The new organisation does not seem to have changed the way the Institute had been developing its scientific activities.

It may be inferred from the extract above that only a new form of organisation of activities that had already been carrying out at the Institute was made and this did not imply in a radical change of the scientific activities but only a reorganisation. A more critical comment is made by Ricardo, a junior researcher, who points out that:

> "when the strategic planning was being made the idea was to restructure the Institution in such way as the research projects could be developed in a interdisciplinary form ... [using this method] there is a more accurate and deeper perception of the issues researched and that was one of intentions of the strategic planning, which even designed a new organisational chart for this purpose. The idea was to have diverse areas of expertise with several programmes linked to those areas and each programme concentrating experts from different backgrounds to work together on specific issues. These would be short term programmes, designed to study social, productive and environmental issues which were affecting the region. However this was not well understood by the advisers who were working with us at the time nor by the staff. There were also some unfortunate political movements regarding the possibility of more funding for those involved on the programmes, and the other ones who were not involved in those programmes would have to look for other sources ... so there was a great movement from research developed in the departments to those specific areas, duplicating activities. Concluding, INPA keeps doing exactly what it was doing before ... this is so clear that even the organisational structure returned to something very similar to its original design before the strategic planning"

Real change in the scientific organisation of the Institute is a very important issue which should have been made in a more strategic, organised and careful way but it does not seem to have been taken place. Ricardo observes the fact that in this changing process and reorganisation of the Institute a different form of scientific structure was defined. This even resulted in the design of a new organisational chart, which would reflect the general research lines and projects at the Institute. The idea behind this strategy is that it would allow a better integration between scientific areas. However, the old organisational chart with its structure of research departments is still dominant in the present day to day institutional activities. A clear example of that is the presentation of the former organisational chart in a 1999 institutional report (INPA, 1999).

These changes might consider things such as the analysis of the potential of the Institute, the involvement of external customers for the identification of demands and so forth. Marcia, a senior researcher occupying a middle management post, comments on this organisation observing that:

> "those PPI's were broadened in that time and it became much more like a collection of things that we have already had, like bits and pieces"

The strategic plan analyses the internal and external contexts of the organisation and gives a series of recommendations that would be essential for the intended transformation. The strategic plan report is a document often referred to by the respondents as a guideline for the improvement process. As we saw in Chapter 4, although some sections (such as those that describe general goals, methodologies and strategies) are reasonably organised in the document, some issues that would be necessary for the success of the Institute are mentioned in a rather general way, with vaguely defined goals and strategies. Thus, the specific necessary strategies to reach the institutional excellence are not clearly set out.

While there is a feeling amongst senior management that the prioritisation of research projects has been a substantial step forward, testimony from those involved in carrying out the research indicates several flaws. Firstly, little seems to have changed practically. People are still working on the same things that they were always working on. Secondly, people's attitudes have not changed radically. Although, as Marcio tells us, this process will take time, there is little evidence that a significant change is beginning to take place. The final problem is that there is no clear idea of what makes a project worthy of inclusion in the priority list. As Marcia told us, "it became much more like a collection of things we have already had, like bits and pieces". This suggests that there is still much to be done to effect the desired changes in both the attitudes of staff at the Institute, and consequently, in the way that the Institute works. The following section will examine the perceptions of the respondents on the conceptualisation of excellence.

Aspects of the Concept of Excellence as seen by Respondents

One key question on the quality management literature regarding improvement programmes is related to the definition of quality and in this specific case the definition of excellence. One of the objectives of the Science Centers project is to set general strategies which would help the Institute to be transformed into a Centre of Excellence. Accordingly, I believed that it would be interesting to identify the respondents' conceptualisations of excellence in this context.

Respondents usually mentioned more than one issue in their replies. Those issues were often related to several aspects like infrastructure, human resources, scientific aspects, and so on. As most of the respondents were not giving the definition of excellence in terms of just one issue, answers were classified according to their frequency. Thus, this section on the Concepts of Excellence is basically organised round the most frequently mentioned issues related to the respondents' conceptualisation of excellence. These issues are: Infrastructure, Human Resources, Financial Resources and a Customer Orientation issue, i.e. a need to attend to local demands on the Institute.

Infrastructure

One of the most cited items mentioned during interviews when asked about their perception of excellence was related to the infrastructure of the Institute. This can be illustrated by the director of the Institute, who observes that:

> "the main step is to have physical infra-structure, and modern laboratories, with equipment that can enable results and work of quality"

Another observation was made by Pedro, a junior researcher who states that:

> "to me it is a dream to see INPA as an EC, because it lacked all the things that have now been available"

The infrastructure as observed by researchers at the Institute was in very poor condition as around nine other comments were made on this subject, most of them by senior researchers. It seems that at some point in the past when the funding for the

Institute was given more regularly, the infrastructure of the organisation was in a better condition but it has deteriorated in recent years. It is interesting to observe that most of the comments in relation to the excellence definition concern the improvement of the infrastructure. This illustrates that it was really precarious and certainly there was a need to improve it. A senior researcher observes that the infrastructure:

> "it is getting better (but) it was in a terrible condition"

Sometimes different aspects were commented in relation to infrastructure improvement. While some of the respondents did not specify clearly what was meant by infrastructure and would give only vague ideas or have only used the general term infrastructure, others could define more specifically what they meant by that concept. For instance, it was pointed out that one thing that needed to be done was the construction of new buildings as well as the acquisition of new equipment.

In a research institution, availability or easy access to bibliographical material is an important resource for the development of scientific knowledge. However, a great deficiency was also highlighted regarding bibliographical resources. There is a lack of provision of updated material at the library of the Institute, with incomplete collections and books and out of date material. Even nowadays, when many modern libraries have information systems using modern technology, the internal library still uses the card system for cataloguing their material. The search at the internal library for bibliographical references also uses this card system.

Another issue related to the infrastructure was associated with the system of communication in the Institute. As observed in an earlier chapter the main buildings of the Institute operates in three different campuses. Communication systems such as the telephone for example, operate separately on each campus. While on the one hand an upgrade on the telephone system was made on the main campus (Aleixo I) as part of that Excellence Programme on the other hand the same kind of improvement was not made on the other campuses (V-8 and Aleixo II).

One aspect related to this issue is connected to the electronic system of communication. The Institute has set up an internal system for electronic communication. This is a internal computer system called INPANET which is connected through a network which enables the interchange of messages, publications, notes and also allows the participation of different researchers in the discussion of different matters. However, not all researchers have got access to that network system. This could be related mainly to a lack of computer equipment itself or lack of modern ones which would support this kind of system. The lack of supply of computing equipment could be observed in some research departments, which is undoubtedly one important instrument for scientists nowadays. There is also a lack of access to the network by other departments, especially in the administrative area. An illustration of this can be observed in the next extract from Marcos, a middle manager and the manager of the project at the Institute:

> "with the Inpanet (the communication) improved enormously, but the ... administrative departments are not involved yet because ... only [a few people] have access to the internal news network of INPA ... few people use computers ... in the research area most of them do, so the exchange of news is quick"

This shows that some of the improvements were certainly not made in a uniform way and in this case of the improvement of the telecommunication system, some departments were left out of that project, especially those in the administrative area. Much less computing equipment is allocated to the administrative area than to the research departments although, as pointed out earlier, not every researcher has got access to a computer. Much of the existing computing equipment is obsolete and out of date. The access to more modern computing equipment is usually not provided by the Institution. In research departments scientists sometimes have to provide equipment themselves.

Apart from the lack of essential equipment which could facilitate the communication within the institution, there are also problems with the oral communication between organisational units. Conflicts were also expressed mainly concerning the

communication between administrative and research departments. João a junior scientist working in a research department of the Institute observes that:

> "there is a serious problem in communication ... the researcher is usually concerned about developing science and usually doesn't know the constraints imposed by the structure of the Brazilian civil service which the administrative staff have to deal with, and that has generated conflicts and there is a general consensus about that ... I think the Institute has got a weak administrative area, the number of administrative staff has been reduced, and they have organised themselves in groups who develop their work in an inaccurate, slow and confused way, and they can't efficiently help the researchers in their work ... the problems generated by this situation are very stressful and we don't know exactly where there is a problem, it might be a lack of qualifications, or it may be a problem of groups who protect themselves because of the 'workplace collectivism', I don't know"

João expresses a strong criticism among other things about the kind of communication between research departments and the administrative area as well as on the performance and development of work of people from administrative departments. One of the suggestions of the Science Centers project was placing in key departments of the administrative area researchers holding doctoral degrees. However, an interesting point in relation to the conflicts of the communication between administrative and research departments is illustrated on the next quotation by a senior researcher working in the middle management of the administrative department. When talking about that communication Marcia comments that:

> "[it is] very complicated, we seem to talk different languages, even working here in administration co-operation is difficult .... the researchers work in the essential areas of the Institute, the research is the main objective, and ... I think probably because of the financial problems and widespread lack of motivation, they are not always willing to co-operate, and it is still worse when a researcher leaves the research area to come to the administration, I think the co-operation diminishes ... it is a very complicated relationship"

The allocation of scientists to administrative departments might be thought to be a way to minimise this kind of conflicts. However, as pointed out in the above extract, the interaction between administrative and research departments does not seem to improve with the allocation of scientists to administrative posts.

The fact that some researchers were working in managerial tasks was also criticised by some respondents. Some suggested that more people from administration should be trained to work in managerial posts in administrative departments, and even in research departments.

In addition to those problems mentioned, other basic problems also affect the development of the work of the organisation. This is the case with the supply of power in the city where the Institute is located, which is a place very poorly served in this respect. The organisation often suffers from power cuts which might stop the work being carry out for hours as they do not have their own source of power which could be used when cuts occur in the area. I have had myself an unpleasant experience when the Social Policy Department laptop which I brought with me to the fieldwork was seriously damaged as a result of one of those power cuts which followed a strong storm in the city. The computer was switched on in the office of INPA where I was allocated.

The implementation of the Science Centers project was sometimes seen as a way to help solving these kind of structural problems though most of the people interviewed agreed that there were still a lot of deficiencies in terms of infrastructure of the Institute. The poor conditions of the infrastructure of the Institute is something which could be easily observed and it certainly needs a lot of improvement.

In addition, respondents have also pointed out that the 'excellence' project for the Institute which includes the construction of some buildings, may in the future have limitations in the utilisation of those buildings, considering the strict policies on civil service recruitment in Brazil. These constrictive policies could be also one more reason why it should not have been prioritised, according to some interviewees, investments in buildings in the 'excellence' project. Considering those restrictions and the average age of researchers working at the moment in the institute it could be

anticipated that in the future fewer scientists would still be working in the organisation. So other factors should also have been considered when defining those priorities, in this case erecting buildings and not organising these recruitment arrangements could mean ample available space in the organisation without a corresponding increase in the workforce for the development of the scientific knowledge required.

Human Resources

Another aspect which was often mentioned by respondents when their perception of excellence was questioned is related to human resources. On this subject the development of the staff of the organisation is the aspect that the senior researchers most frequently mentioned. One of the issues in this case was that for an Institute to become a Centre of Excellence the quality of their human resources should then be of a high standard.

Marcio, a government official and middle manager when talking about his definition of excellence observes that:

> "it is difficult to define, excellence is something that you do very well, that is excellence. So I think that for an institute to achieve excellence it needs to have a set of things that we have started to organise (at) the institute now. It needs to have a basic infrastructure ... it needs to have qualified and motivated human resources, that is essential. In that environment you are going to achieve your goal, which is to generate the best kind of science. You have to generate scientific knowledge which can be applied and which brings good results for the benefit of the local people ... So, that is what I understand by excellence"

It was also expressed by the top management that one of the strategies of the organisation as part of the human resources development would be to have all the scientists holding doctoral degree in five years, as discussed earlier. The constraints on recruitment of new staff imposed by the Brazilian government restrictions and bureaucracy on contracting new people may justify such a strategy as long as this recruitment can not be done easily in the Institution. However, it is certainly

important to have scientists with different levels of qualifications so that a good mixture of expertise may generate an environment more conducive to good science.

On speaking about Brazilian governmental constraints in civil service recruitment, among other things Rogerio, a governmental officer who works in Brasilia and has a scientific background, when explaining his definition of excellence he states that:

> "when we think of INPA as a Centre of Reference [a term I prefer to use] it means that thanks to the work that has developed along those 40 years it has gained a certain competence in some areas ... INPA is an important reference at a regional level ... [but] I would perhaps avoid at the present phase the terminology excellence, because there is still a need to define certain research groups. Excellence you don't label to the institution as a whole, even at international institutions, excellence you define for areas. INPA has lost a lot of staff along these last years thanks to a disastrous [governmental] personnel policy which couldn't retain people there. So to transform them into a Centre of Excellence in some areas you need a continued policy for retaining staff. Is it a centre of excellence? No, there is still a lot to be done to become a centre of excellence ... it has some researchers of excellent level, who write papers for international journals. However for the image I have of centre of excellence that is a goal that there is still a long way to go"

This outsider participant recognises that the government has had restrictions on the personnel policies for organisations located in the public sector, such as the inability to provide incentives to retain people, recruitment and so on, especially for those institutions situated in the North of the country. Given the specificity of the work developed at the scientific institutions they should certainly have been able to have more flexibility on the management especially of their human resources.

Apart from the concern in relation to the institutional human resources development in general, the question seemed to be also related to the retraining of the scientists and training of people of the administrative areas. People in scientific posts need to be constantly updated on new advancements of science and technology, be able to participate in scientific events and so forth. Scientists usually have to follow

different paths in their careers leading to more qualification, have different systems of training, and so on. Funding for training of people working in scientific activities for instance could be obtained through governmental offices specialised in investing in the development of scientific researchers in Brazil whereas training for administrative staff is usually a responsibility of each organisation. Despite the fact that the Institute has got a training programme for their staff, it seems that it has not achieved the expected results as can be grasped by their concerns. The administrative staff as part of the integrated scientific system has also to be able to help the organisation to achieve its objectives.

There are at least two official institutions linked to the Brazilian government, located in Brasilia, for postgraduate development programmes. Those are CAPES - Federal Agency for Postgraduate Education (*Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*) and CNPQ - National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico*) where Brazilian citizens can apply for scholarships for postgraduate programmes, as well as for attending scientific events, in Brazil or outside the country.

Another sort of concern raised in relation to the current staff working at the organisation was connected to their age and the time they have been at the organisation. Mateus, one junior researcher working in the middle management of a scientific dissemination unit observes that:

> "the level of excellence is very relative, it could be related to human resources and also their satisfaction, because when that person is trained to work in this Centre of Excellence, it will be time for his retirement"

The observation made by Mateus is related to the fact that the average age of their scientists and administrative staff is comparatively high in relation to other institutions. This is a situation which is certainly closely connected to government policy constraints in recruiting new staff which does not allow a turnover of employees. The Institute has not been able for some years to recruit new staff given such governmental policies. Some of the participants pointed out these criticisms

relating to the average age of the scientists and some investments which have been made as part of the Excellence Programme. They observed that some of the investments of the Excellence Programme were in infrastructure and construction of new buildings. However, as commented in the previous section, if changes are not made on the policies for recruitment of new staff, in the future fewer people would be working in these buildings because the number of staff working at the Institute has been decreasing along the last years. In addition other cause of concern was the loss of staff who would leave for other institutions which could offer better salaries or work conditions to them.

However, apart from the fact that there are several restrictions for the management of human resources at the organisation such as those related to the contract of new staff for the Institute, the policies also impose restrictions on the dismissal of employees. Carlos, a senior researcher and a senior manager of an administrative department, states that:

> "when there weren't many specialised people, the number [of people] was important, now the number is not that important. What is important is the production, the expertise, and the product. We cannot get rid of people, they are leaving because of their age [retiring], or because they prefer to apply to other places. So there is a number of people [quantity] but there is no quality yet and I believe that we can't act on those numbers yet. We have to come up with a way [to work] where we have more than 700 [people] of whom only 300 produce"

Carlos expresses a strong criticism on the quality of the scientific knowledge generated as well as on the constraints on the dismissal of staff. His observations relate to the fact that for some years since the setting up of the Institute many of the staff recruited to work at the organisation would not have formal educational qualifications. Many scientists went into training to get their qualifications after they had been working at the Institute. The number of people at that time holding masters and doctoral degrees was very small.

It would be necessary for more autonomy to be given to the Institute for the management of their human resources. Thus it would be interesting to design mechanisms which would change the institutional personnel policies in order to allow the possibility of recruiting new staff and also allow flexibility for the organisation in terms of dismissal of employees. A great emphasis is given by Carlos in relation to the scientific production at the Institute. He observes that the scientific production of the organisation is low given the numbers of scientists of the Institute. This can certainly be a serious problem at an institution which aims to be transformed as a reference for excellence in its area. Chapter 7 will discuss further this issue presenting some indicators of the scientific production of the Institute.

Uncertainty of Flow of Resources

Excellence in terms of scientific aspects was also sometimes related to financial resources like the regular flow of research funding, financial management independence, and so forth.

Research funding was an issue often mentioned by participants at the Institute. The main source of funding for research at the Institute comes from the central government. As a result the organisation depends enormously on that source for the development of its scientific activities. However, the flow of resources for research often comes in an irregular form with occurrence of delays and cuts in its disbursement. Sometimes the proposals for some projects are approved but funding would not be formally credited for implementation. One of those concerns and an example of the situation experienced at the organisation, was expressed by Fabricio, a junior researcher who comments that:

> " ... how can you make a research programme work if you can't predict when the money is coming ... because the [disbursement of the] resources to the Institutional Programme is sometimes unpredictable, we plan the fieldwork and the money for it doesn't come so we normally have to adjust our research timetable to the funding disbursement timetable ... many times this is a situation which discourage the researcher ... [because] those financing and legal difficulties in issues of

> resources disbursement, thwart work which is made and planned according to the possibility of carrying it out. Then you have to improvise so the goals may be achieved, you [have to] change the timetable, the amount of fieldwork, [some] equipment which you needed at the beginning of the research project you get only at the end of the project ... resources are disbursed 10 days before the end of the financial year, and all these complicate the scientific development ... In research projects when funding is delayed there is a risk the harvest time is gone"

This is an interesting illustration of the problems which may be generated as a result of those continuous cuts and delays in the disbursement of the financial resources for the development of their research projects. The dependency on the federal funding and that irregular funding causes great hindrance for the management of the financial resources at the organisation.

Customer orientation - Meeting local demands

The literature on quality often emphasises that quality is closely related to customer requirements and satisfaction. The fact that the development of scientific research may not be targeted to local demands, or to its customers, was one important issue pointed out by some internal and external participants. At the Institute the need to attend local demands, was emphasised by both senior and junior researchers.

I have questioned some of my informants at the organisation about the identification of their customers. One of the participants, Marcia, tries to define the customers, observing that:

> "the producers are usually the customers of the Agricultural department, the doctors and health care institutions are customers of the Health Sciences department, the lectures and students from the University and from other institutions are customers of the results generated by the researches developed here. The government could also benefit from the knowledge generated here"

It can be noticed that Marcia gives examples of customers of the Institute in very general terms. Generally there was not a single definition made by all participants

about who their customers would be and different replies were obtained although some participants have mentioned similar customers. For instance, the producers or the productive sector was also the most mentioned customer of the Institute referred to by other participants. Others mentioned as their customers the universities and other public institutions, the local and federal government and the local community. The industry and people connected to ecological tourism activities were the least mentioned of possible customers.

It is important to identify those customers of the organisation and a closer interaction with those potential users of the scientific production generated at the Institute is necessary in order to define objectives and research priorities. On this subject Mauro, makes the following comment:

> "I think that we should have closer contact with other sectors of society, like local and central government, social and corporate organisations, unions or something like that, so we could identify the needs and act on that. I think we do a little of that but we don't do enough. I think we need to have something more structured"

Although Mauro does not define clearly the customer, this respondent recognises that a more satisfactory approach with the society is something that the Institute should pay more attention to. Thus, it seems that there is not much interaction between the research institute and local government, industries, other scientific and public institutions or local society in general. The interaction of the Institute with the community would become more interesting if mechanisms for this interaction could be created. However it is also not clearly suggested how the identification of those demands should be made. The need to attend demands is a important issue mentioned in interviews at the Institute, but the mechanisms, policies or strategies for how these demands should be identified were rarely mentioned. The proximity to the local society could help in the identification of these local demands.

In order to try to minimise this gap and have a more interactive approach with the local society, one of the changes made at the Institute was the setting up of a new organisational unit at the organisation, called *Coordenação de Extensão*. This unit acts

as a department which liaises between the Institute and external customers. Gabriela, a senior researcher, gives a short illustration on how the approach to the research department which she is linked to is sometimes made:

> "the customers they usually go to the *Coordenação de Extensão* first and then they send the person here"

Although the creation of a department may be an initial step for the objective of making a greater interaction with society, the setting up of a department by itself would not be enough to narrow that gap, and would probably not have the necessary mechanisms and power to generate the needed changes. However, mechanisms and institutional strategies should be developed for identification of demands of the organisational customers as well as clear definition of research dissemination policies.

Scientific aspects

In addition to those items cited, some respondents also related their perception of excellence to some aspects of scientific quality.

From those issues mentioned in relation to scientific aspects the most often cited by senior researchers could be associated with the generation of scientific knowledge. As an example Francisco explains that:

> "excellence should be to generate knowledge, and research, and to have people to disseminate this knowledge. All of these in those areas where the Institute excels, it is necessary to be good, at the highest level, where we produce science, and internationally recognised"

Emphasis was also given in terms of dissemination of the knowledge generated, by both senior and junior researchers and people from the administration of the Institute, as pointed out by Manoel, a middle manager from an administrative department, who defines excellence as:

> "the best in its area. I think it is great that this research has been developed, which can be disseminated. It is not important only study but to disseminate this knowledge, so people can use it"

The comment made by Francisco gives emphasis to the generation of knowledge of high quality. It is interesting to observe that both extracts present concerns about the dissemination of the scientific knowledge produced at the Institute to its users, or its customers, an issue also discussed in an earlier section.

The concept of excellence related to scientific aspects by respondents was therefore linked to aspects such as the generation of knowledge and the quality of that knowledge being of international standard. In addition, others also related their responses to the structure of research and generation of this knowledge even on a short-term basis. In this case results would be available earlier than usual in the present form of output of the Institute.

These issues seem to emphasise the generation and dissemination of scientific outputs of good quality and in a shorter space of time. Although they are connected to very important issues, they represent only individual concerns as this thinking does not seem to be reflected in an institutional strategy.

Organisational aspects

Excellence was also expressed, by some senior researchers, in organisational terms. Marcia, for instance, observes that an excellence organisation:

> "would be an institution specialising in Amazonia, with most of its human resources working in this area. Would be the organisation where most of its researchers would be studying those specific areas"

Marcia gives her definition of excellence as an institution that is specialised in Amazon issues. This seems to emphasise that, as such, the Institute would be identified as a reference centre in its area of expertise.

The role of the institute can be important in contributing to the generation of scientific knowledge in the region. In this sense it seems that it would be essential to

strengthen the Institute. Its structure, functioning and management certainly need to be improved. Mechanisms which could help identify the demands directed to the Institute should also be defined. It is important to establish a more satisfactory relationship with local society, and society in general, which would probably facilitate the identification of their demands and its attainment.

Table 8 presents a summary of the respondents' perceptions in relation to their conceptualisation of excellence at the Institute. The numbers on last three rows represent the frequency of each specific issue mentioned.

Table 8 - Concepts of excellence at the Institute.

	ISSUES	RESPONDENTS		
		SENIOR	JUNIOR	ADMINIS TRATIVE
INPUTS	INFRASTRUCTURE	7	1	1
	HUMAN RESOURCES	5	1	1
	FINANCIAL ASPECTS	1	1	-
	AUTONOMY	-	-	1
	GENERATE AND CONCENTRATE MOST KNOWLEDGE ABOUT AMAZON	2	-	-
OUTPUTS	DISSEMINATE KNOWLEDGE	1	1	1
	INTERNATIONAL RENOWN	-	1	-
	ATTEND DEMANDS	2	2	1
	HIGH QUALITY INSTITUTION	3	2	1

Stick to What you Know Best

In the literature on quality and excellence, the works of Peters and Waterman identify eight attributes in their search for excellence in American manufacturing companies. Although not all of those attributes can be clearly applied in a public sector setting some of them may be used in studies involving the analyses of public organisations. Given the intrinsic bureaucratic character of the Brazilian civil

service, for instance, it does not seem that there is much scope for the autonomy attribute of the work of Peters and Waterman to be easily applied. Although not completely imposing restrictions, a lack of autonomy does certainly limit a second attribute identified in their work, which is the action-orientated attitude.

One strategy of the Excellence Programme is to spend a large proportion of its investment in the improvement of two departments at the Institute, named the Aquatic Biology and Ecology Research Departments. This strategy could be related to the Stick to What you Know Best, which is the number six attribute. That attribute states the companies which stay closer to the business that they know, in opposition to the ones who decided for diversification of their business, were more likely to succeed.

One other aspect also mentioned by Lucas, was related to the academic activities and the number of postgraduate courses that has been carried out at INPA. The respondent observes that:

> "Graduate courses are not a responsibility of INPA, that is the responsibility of the University, not of INPA. It is not INPA's responsibility to train medical doctors or business administrators. INPA should be a research centre to serve as a reference for postgraduate students. It is not advisable for INPA to have a large number of postgraduate courses, they should be at the University, and the students should only develop their thesis there ... because INPA is not an academic institution, it is a research institution ... it was created to develop research, and in the process, to train researchers, which is a different thing"

The comment made by Lucas, a governmental official from MCT, expresses concerns in relation to the institutional activities of the Institute. In his comments he observes that the Institute should concentrate on its most important activities instead of developing its performance in a wide range of activities, a view supported by Peters and Waterman (1982). The Institute has got in its structure a Health Sciences Department. The development of a number of scientific activities related to the

health sciences is cited as examples of those activities which are not included as the main activities of the Institute and therefore the organisation would be advised not to perform. Although the respondent stresses the importance of developing this kind of activity, he stresses that it is not among the Institute's responsibilities to perform activities in this area. Other governmental agencies of the region could and should perform this kind of activity.

This section has presented some additional information and comments related to the guideline documents involved in the improvement process at the Institute. Given the history of the organisation, its characteristics, performance and management, a project which aims to transform the Institute into a Centre of Excellence would be certainly a great challenge to the organisation. As such, it would be interesting to observe the perceptions of the participants of the Institute, as well as those participants from Brasilia in relation to their evaluation of the Institute. The next section is going to analyse issues related to the evaluation of the Institute by these respondents.

Evaluating the quality of the Institute to improve excellence

One of the interests of the study was to analyse the perceptions of the respondents in relation to the Institute. This next segment is concerned with the evaluation of the organisational quality of the Institute, and other relevant issues to the organisation discussed during the interviews.

I contacted people placed in units hierarchically superior to the Institute, working directly with the Science Centers project. One of these people contacted was Marcio, one of the government officials placed in Brasilia. When questioned about his views on the Institute, he makes the following observation:

> "I think the Institute is extremely important at a national and international level. I think that INPA already managed to develop important research, and raised the knowledge several things of fundamental importance to the region and to the country. There are some programmes at INPA ...[and knowledge] which can now be transferred

> to the rest of the country, there is already an actual economic result coming from the research. I think that INPA's role is fundamental, and I also think that the money we are managing to put there still is too little, because ... INPA acts in practically all areas, it is clear that it is stronger in some areas than in others. ... it needs to develop other areas. ... the goals of INPA are to participate in the regional development policies, promoting the use of natural resources in the production of the development of the [local] population... These are practical things that have been done already, creating mechanisms to get new resources to research, because it makes no sense if you put resources during a period of time and then cease this investment. The Institute has also to make itself able to get these resources"

The governmental officials were generally critical about the Institute, although Marcio seems to express an enthusiastic evaluation about it and the importance of the knowledge generated there. He also observes that the Institute is stronger in terms of scientific production in some areas than in others. He considers that the money that has been invested in the organisation is not enough in face of the Institute's importance and in terms of the knowledge that needs to be generated in the region. Thus he points out the need to make continuous investments.

The observations made by Marcio reflect the behaviour of some investments in government programmes in Brazil. These investments, especially those related to science and technology, are made in a very irregular way. They are made only in a certain period at the beginning of scientific programmes, and are often delayed, so that later the institutions do not have the continuous access to resources needed to carry on their activities, as pointed out earlier by Fabricio.

In addition, Marcio also seemed to hint at the need for the organisation not to be dependent only on public funding but define mechanisms to get funding from other sources. As mentioned in Chapter 1, the Institute is largely dependent on irregular governmental funding. As a result of this, throughout its existence the Institute has gone through periods of stability followed by some periods of complete stagnation which has been constraining its performance.

Another interesting comment comes from Marcia in relation to the research of the Institute:

> "I think most research done here, is of great importance. Many parties have different interests in the Amazon which are often conflicting. The [Amazon] state works hard to produce something and this goes against the rain forest and the international interests (as the pressure to publish is quite strong). So I think there is a conflict of interests and this makes it difficult to control ... I think the devastation is much faster than we can control it, so I think that any research carried out here is important. However, much of this research is not linked properly. We have information in any area you want, ... but it is isolated ... there is no detailed information about a certain ecosystem. Probably the most researched place is the Ducke Reserve, but I think we need more, which implies bigger costs. That is because research is expensive, and it is necessary to optimise the use of the resources. I think we still don't have good control over this"

One interesting aspect here is that environmental interests to conserve the forest would have involvement and pressure from environmentalists to conserve the natural bio-diversity of the region. Another important aspect is the need to generate more knowledge about that environment and the scientific interest to develop scientific research in the area. A third controversial aspect is related to the economic use made from the natural products originating from the forest. All these aspects often generate conflicting issues. In the case of the Institute the international pressure seems to urge the generation of more scientific knowledge, but the groups responsible for the exploitation of its natural resources does not seem to be willing to wait until this knowledge becomes accessible. This may turn out to be even a more difficult issue, as the information produced at the Institute seems to be so fragmented.

A similar comment is made by Rodrigo, another senior researcher of the Institute involved in the Science Centers project who observes that:

> "INPA has a history of 43 or 44 years of scientific research on the Amazon amounting to a large volume of information. Of course it has

> got a lot of deficiencies. One of the reasons is that it used to work very intuitively, and when they started to make us aware of this Centre of Excellence then we started changing direction, which gave to INPA and the region a new more suitable meaning. I think that from now on INPA is going to produce much more, and I think it has got the same standard as any international institute. INPA is the greatest tropical research institute of the world located in the tropics. There are other research institutes in the tropics as significant as INPA which are maintained by other countries, but not led by a developing country as is Brazil. The Brazilian government was always aware of what it wanted from INPA ... there was always the awareness that INPA represented a national defence ... it meant the protection of the [scientific] knowledge, though we can not always keep all the knowledge within the country. This [region] is so big, it is so open, but we need to stand up for the knowledge ... I know the Institute very well ... we cover many aspects of the science ... the Institute has a wide range of activities, of course this such a large array of activities may hinder its production, but that is natural"

Although Rodrigo shows a great enthusiasm for the scientific production of the organisation and even makes a favourable international comparison, he also observes that it used to have a lot of deficiencies. One of those deficiencies is related to the fact that the Institute used to develop its works intuitively. This seems to be a comment that it has been producing knowledge without much scientific foundation, a shortcoming that he believes could be changed with the Centre of Excellence Programme.

The comment made by Rodrigo that "there was always the awareness that INPA represented a national defence", expresses the concern about the national sovereignty that preceded the creation of the Institute. As explained in more detail in Chapter 1, the history behind the creation of the Institute followed a series of plans to prevent the creation of an institute of international jurisdiction and control, to develop scientific studies in that region, prompting the Brazilian government to create INPA. This proposal of an international institute in the country was seen as a threat to the national sovereignty of the country. This concern in relation to the national

sovereignty was even expressed in the initial organisational mission of the Institute but does not seem to be part of the most recent mission defined at the Institute.

A breadth of focus

When INPA was founded, its mission and objectives at the time certainly reflected a different environment from today, with general needs being much more different. At that time, as pointed out by some participants, the scientific knowledge about the region was very limited, as not much information was available. Just identifying and cataloguing products of the forests was considered a great achievement. The objectives of the Institute defined more than four decades ago would certainly not reflect the demands of the modern world, such as those connected to more contemporary concepts like biotechnology, sustainable development and so forth.

Nowadays, only to make inventories, collection, identification and classification of the plants certainly does not reflect the demands of the environmental institutions in the region. The Amazon rain forest has a rich bio-diversity and although there is still a lot to be studied, the research developed has generated important knowledge about the region. One example is research on active biological elements that have already been used in pharmacology and cosmetics. There is also certainly a need to develop more knowledge, given the attention that is given to biotechnology these days.

With regard to the wide range of activities developed at the Institute mentioned by Rodrigo, a different point of view is expressed by Lucas, another government official and senior manager working at the same Ministry in a higher position, who mentions that:

> "INPA is inherently a complex organisation, it is necessary to be careful not to want to do everything. For example, sometimes for lack of options, INPA may want to supply needs that are not of its responsibility. INPA sometimes worries about aspects of health, for example, which is commendable, but is not among INPA's specific activities"

It is interesting to observe here that both respondents, Rodrigo and Lucas seem to agree in one point. The same kind of comment made by this outside respondent in

relation to the wide range of activities performed by the Institute is also pointed out by Rodrigo in the last part of his extract. Another interesting point about the comments made by Rodrigo was on the awareness that the Institute represents a national defence and on the great importance, as he points out, of the Institute, which, in fact, does not seem to match up to the general performance of the Institute. The fact that the Institute develops its work in such a wide range of activities is seen as a shortcoming of its performance.

Application of scientific knowledge

As an Institute of reference in the Amazon region, the application of the scientific knowledge generated at INPA was one of the themes pointed out during the interviews. Ricardo, a Junior Researcher of the organisation working in the management area, in the next extract talks about the utilisation of the information generated there, saying that:

> "those research departments that are nearer to the production sector, ... work closer with the future users, [so] there is transfer of the knowledge... and I think that in this aspect, INPA is efficient, but we have 12 research departments, and most of them insist in doing basic research. In this Institute a department rarely knows what another one is doing, except in a few [isolated] cases ... so from this situation results a very low application of the knowledge produced here. And then, you have fragmented results about the region. And there is also a problem of scientific geopolitics ... we have expeditions of zoologists in one place and botanists in another, each one producing its data, when it would be more useful and logical to have a hierarchy of important areas to be approached by science: areas already approached by development, areas to be incorporated by development and areas that have no prevision of incorporation by development, and then concentrate all the research at INPA within these areas. Data produced in that [fragmented] way is much harder to absorb. There is also a cultural issue and with respect to our underdeveloped science, being Latin American, and of the third world ... people are not prepared to work towards demands, they are trained to solve the big mysteries of nature and to whomever is better

> equipped, that translates into money, in economic advantage ... There is also a very important cultural side, the side of our political and economical elite, that historically are used to every time they need to be updated or need a solution, resort to importing technological packages, equipment, solutions and all the rest. So with this there is a habit in how demand from society and the productive sector of research institutes are dealt with. There is another problem also with respect to the way science presents itself, its procedures and mainly its language, it is very difficult for a layman to understand certain scientific works. The people who understand it are the people of the area, the people who are connected to it. So things have to be done in another way, besides the scientific standard, to create a more accessible format to the same knowledge... and another way out, is from the start of the research to know whom is to be addressed to and how, ... that's more difficult. We have a knowledge supply that is difficult to evaluate and to know what to do with it"

The application of this great body of information stressed by Rodrigo seems to be somehow not done in an efficient way. This may be caused by the fragmentation and disconnection of this information, which results in a low application of the knowledge generated at the Institute. It is interesting to note that the observation of Rodrigo, in relation to the need to develop a strategy to make the generation of that knowledge and its utilisation more efficiently, was a concern also generally expressed by other junior researchers. Over the years, the Institute has generated a significant body of knowledge, but it has difficulties defining what to do with it.

Fragmentation of departments and activities

As observed in an earlier chapter, the institutional scientific units seem to add up to systematic coverage of the different aspects needed to study the Amazon region, but according to Weigel (1994) this might not show clearly the strong fragmentation of the activities which this kind of model generates.

The fragmentation of those research departments of the organisation can also be observed in the scientific units within each department such as the laboratories. The scientific departments usually have different laboratories for the exclusive use of that

research unit. Duplication of important and expensive equipment may be found in different laboratories. In order to minimise the expenditure of financial resources and maximise a more efficient utilisation of the labs and equipment for use by a greater number of researchers, the Institute started to implement an initiative which would aggregate some laboratories. Nominated thematic laboratories, these units would have a wider access and could be utilised by a greater number of scientists and research units.

In addition, as also observed by Marcia in an above extract, Ricardo comments that there is a lack of definition of geographical areas to be studied by different scientific areas of the Institute. As a result there is not a detailed study about the same region because different fieldwork expeditions of the organisation are carried out separately and not planned in a rationalised way.

Another important aspect refers to the disconnection of the scientific knowledge produced within this scientific structure. This structure may result in the generation of scientific knowledge without much connection and interaction. Such knowledge may be difficult to absorb and not directed to demands. In addition, to generate knowledge that attends to the demands of customers, this knowledge should be presented in a more accessible and understandable format.

A similar kind of comment in relation to the lack of integration of activities is expressed by Mauro, a senior researcher of the Institute, who has also been involved in the Science Centers projects. In his evaluation he observes that:

> "I think the main fault comes from the thought that existed in the Institute that everybody should do their work without any need for integration, and this is a cultural aspect of the people that will not change instantaneously, not even by any official instrument. This way of thinking is changing slowly as the people realise they cannot work alone, there is a need ... a requirement not only from the scientific community, but also the society which INPA has contact requires this sort of rationalisation. So the flaw is that there is still a difficulty in the implementation of this strategic plan. Although some people are already

> trying to link their work, there still is an inertia. It is difficult to change that. I think the important thing is that there is already an effort in that direction, and things will adjust themselves. It is our role to criticise and improve this, leading things to the right direction ... I think the Institute needs to discuss more these issues ... I think the tendency is for us to have more integration, but it is difficult to act in an Institute which is multidisciplinary, has more than two hundred researchers ... it is a bit more difficult. It is not easy for a large institute like INPA, which conducts much separated work"

Mauro clearly states this lack of integration of the work of the Institute and at the same time observes the need to make changes. The reorganisation of the scientific activities of the Institute made in the process of setting up a Research Agenda when the scientific projects were organised into nine broad programmes, was certainly an attempt to make a more rational scientific organisation. However, the respondent points out that changes in these aspects have been too slow and not much modification seems to have been noticed yet.

Personnel management

Another important aspect pointed out by the external respondents is related to the management of human resources and the constraints of the Institute, as discussed above from an internal prospective. An interesting opinion was given by Rogerio, another Senior Researcher and Senior Manager governmental officer, who states that:

> "and the institutes still have a problem not solved yet, one involving the government policy: the personnel issue. The Institute has continued, for several years not to contract new people. Thus when people retire or leave for whatever reason, sometimes for the chance of getting a better wage in another institution, the Institute cannot replace them. This is an extremely important issue, and the current policy keeps going on ... in this specific case, if these centres want to be reference centres, they should have a different treatment, otherwise, they will never reach the status of Centre of Excellence. They will continue to be [some sort of]

> references, because they are [already] somehow references ... [but] if there is no specific policy, there is no way to reach the Centre of Excellence status. It is an enterprise that involves a macro level government issue, to consider science and technology an important thing to the country and this cannot stay only at the discourse, there must be a correspondent effect on the national budget. It involves promoting science and technology more and more, as something really important to the country. It should involve having a regional policy, because there must be an idea that it is necessary to develop certain regions, and the Amazon needs special attention from the government, because it is important at the strategic level. Brazilians should emphasise that Amazon is an important issue, otherwise it will turn up being more important to the international community than to Brazilians. Why it [Amazon] is so talked about? That is something to consider. Currently, the international community has more perception of the importance of Amazon than Brazilians ... That's for sure"

Aspects related to the human resources and science and technology policies were stressed by Rogerio. Regarding the personnel issue, he mentioned that restriction by the idiosyncrasies of government laws has restricted recruitment. As a consequence the organisation has not contracted new researchers. Although the Institute has got a significant number of people holding postgraduate degrees it is low when compared to other Institutions in the south of the country and also small given the size of the Amazon region (more than 5 millions of square kilometres).

The problem with low salaries paid to the staff of the Institute has sometimes caused people to look for better salaries in different institutions. As an example of these wage differences, the salaries of researchers working at the local public funded University is higher than those paid to the researchers of the Institute. Differences in salaries may be observed in people working in different Ministries of the Brazilian government, even if they pursue the same kind of activities. In the specific case just mentioned, the former organisation is subordinated to the Education Ministry and the latter to the Science and Technology Ministry.

In addition to the personnel constraints mentioned by Rogerio and discussed above, the respondent considers that as the Institute is located in a strategic region, it deserves special treatment in terms of different policies relating to the organisation. Thus, according to him these personnel and scientific policies for instance should certainly be reviewed, otherwise he observes that this has been a serious issue at the Institute and expresses clearly that the attempt to transform the Institute into a Centre of Excellence would not be achieved if this situation is not changed.

Table 9 – Quality evaluation of the Institute.

		SUPPORTIVE			CRITICAL		
		OFFICIAL	SENIOR	JUNIOR	OFFICIAL	SENIOR	JUNIOR
SCIENTIFIC ASPECTS	Importance of researches	1	1				
	Fundamental role	2					
	Wide range of activity	1	1			1	
	Pressure to produce information					1	
	Has produced a lot of information		2				
	Too much disconnection					2	1
	Too much fragmentation					2	1
	Has an international standard		1				
	Greatest in the tropics		1				
	Represents a national defence		1				
	Develops work intuitively					1	
	Detached from society				1		1
POLITICAL	Investment not stay only in discourse				1		
	Prioritise region				1		
FINANCIAL	It needs more investment				2		
	Look for other sources				1		1
ADMINISTRATIVE	Not recruiting				1		
	Not able to replace positions				1		
	Need to have different policy				1		

Table 9 summarises the opinions of the Institute expressed by people from inside and outside the organisation. The column identified as 'official' represents the frequency of the opinions of the government officials interviewed in Brasilia whereas senior and junior represent the opinions of the researchers at the Institute. While some respondents present a positive view of the organisation others do not. Most of the

governmental officials contacted presented some concern about the organisation, either it performed too wide a range of activities or was restricted by the intrinsic bureaucracies of the Brazilian government regarding personnel and scientific policies. As such, many of the issues raised present aspects related to the characteristics of the public administration of the Brazilian civil service.

Yet in relation to the evaluation of the Institute, even among those people with a more positive perception, concerns were raised in relation to its broadness and the disconnection of its activities as well as the different interests surrounding the area.

Conclusion

This chapter has presented the analysis of the improvement process at the Institute. It is based mainly on the data collected during interviews made with governmental officials and INPA's staff.

In an improvement process the managerial style of the top manager is likely to play an important role on the implementation of the required changes. The managerial style of the Institute was investigated and it was perceived with some dissatisfaction in one hand, and on the other hand the management of the Institute has had also a degree of support.

The perceptions of the participants on the improvement process of the Institute has shown us that while half of the respondents, including most of the senior researchers, see the project as a good initiative, the other half expressed some doubtful or critical perceptions in relation to the project.

In analysing the quality of Institute most of the issues commented were related to scientific aspects of the organisation. That section presented different views in relation to the scientific quality of the organisation. Some participants pointed out that the development of the institutional activities plays an important role in contributing to generation of scientific knowledge to the benefit of the region. It has also been pointed out the necessity to develop scientific knowledge more clearly connected to local demands.

INPA sometimes receives criticisms from some sectors of the local community (government, media, and so on) for developing its work detached from the society. It seems important to establish a more satisfactory relationship with the local society as well as devising strategies for identifying and attending these demands.

Although some concerns were raised at the Institute related to attending demands of society, it can be seen that there is a lack of interaction between the Institution and its customers. Despite the fact that some departments of the Institute have got some integration with their customers, especially those which develop its work more connected to the productive sector, most of the departments do not have this interaction with external customers. It is also interesting to observe that the requirements of the Excellence Programme were not generally seen as demands which needed to be attended to.

In addition, the development of knowledge more related to basic rather than to applied research might also be one other reason for this lack of interaction between the Institute and its customers. Public organisations might be aware of the demands of the environment in which it exists. Given these dynamics of that changing environment and the questions imposed by the external agents with whom the organisation has to deal with it may no longer be possible to carry out effectively the organisation performance without considering those circumstances.

Many works on the quality management studies discuss the definition of 'quality' or 'excellence'. Some studies have observed that the exact definition of quality or excellence in the public sector organisations is a complex issue. The findings of this work also suggest that this might be the case in scientific institutions. It could be observed in this research that there was a lack of a single definition for excellence.

The definition of excellence was usually not related to only one aspect or to specific scientific aspects, like those related to development of research of top quality, for instance, but they were in most cases related to several aspects and usually related to very basic issues which have been deficient at the institution. Though the respondents did not provide answers related only to single specific things (like infra-structure, equipment or physical structure alone) or in terms of conceptualisation of

excellence which could be essential to achieve the desired excellence, some of the participants believed that the provision of some of those issues mentioned would help the institution to accomplish that desired status.

Thus, the conceptualisation of excellence in this study demonstrates that a greater emphasis was placed by senior researchers upon issues that can be characterised as inputs to the scientific development such as infrastructure and financial and human resources aspects whereas issues connected to outputs of the research has been less emphasised.

However, in a scientific institution, the concept of excellence is more likely to be connected to the scientific production or knowledge generation (research outputs like reports, scientific publication, dissemination material) than to the provision of a better structure for developing their work (research inputs, like the infrastructure, equipment, flow of resources). The items that would help the Institute to alleviate many of its basic deficiencies, like the provision of an infrastructure, equipment and more laboratories, may be the means through which the scientific production can be increased.

Although it is important to be clear that both inputs and outputs are important in a process of improving the institutional quality, the provision of a better structure, which may represent only the means to which the goals can be achieved, does not necessarily gives any guarantee that the quantity or quality of their scientific production would be improved as a result of that.

Chapter 6 – International Organisations

Introduction

The data presented in this chapter is mostly concerned with the description of some of the international agencies involved, their views about the Institute and their perception of the ongoing improvement process. Thus, this chapter gives information about some of the international organisations involved in the improvement process at the Institute, presents an evaluation of the organisations, their international context, co-operation with INPA and concerns about the process. As we will see the respondents' views present a different, and sometimes more critical, evaluation of INPA from those presented in Chapter 5.

International Scientific Co-operation

As an Amazonian research institution, INPA has, since its creation, carried out scientific work in collaboration with national and international organisations. As well as scientific co-operation, there are other types of collaboration between the Institute and other organisations, which can be categorised as Technical Co-operation and Financial Co-operation.

Among those institutions which have projects running in collaboration with the Institute or under negotiation, are: Max Planck Institute (Germany), ORSTOM (France), British Council (Great Britain), International Tropical Timber Organisation/ITTO (Japan), Japan International Development Agency/JICA (Japan), International Development Research Centre/IDRC (Canada), International Foundation for Science/IFS (Sweden), CONACYT (Mexico), Government of Spain, New York Botanical Garden (USA), Smithsonian Institution (USA), National Science Foundation (USA), NASA and the University of Washington (USA), The Woodshole Research Center (USA), University of Maryland (USA), Western Michigan University (USA), CIRAD/CTFT (France), Overseas Development

Administration/formerly ODA, now DFID, (Great Britain), University of Cambridge (Great Britain), *Universidade de Napolis* (Italy) and the *Institute Cooperazione Economia Internazionali* (Italy), (INPA, 1993).

For the purpose of this study, six of those international organisations which have been involved with the Institute either through the Excellence Programme or through scientific or technical co-operation were contacted. Table 10 gives an overview of the kind of co-operation in which these organisations were involved.

Table 10 - Type of co-operation

ORGANISATION	**TYPE OF CO-OPERATION**
CIRAD	Scientific Co-operation
JICA	Technical Co-operation
MAX PLANCK	Scientific Co-operation
ORSTOM	Scientific Co-operation
ODA	Scientific and Technical Co-operation
WORLD BANK	Financial Co-operation

Scientific co-operation usually involves the exchange of scientists and scholarships, as well as support for research projects. It is usually designed to involve a scientist or a group of scientists from Brazil or overseas, coming from different organisations, to work in research projects in collaboration with scientists from the Institute. On the other hand, technical co-operation does not necessarily involves working solely in research projects but instead would involve the training of scientists in activities related to research, for instance, utilisation of equipment or use of technological methodologies which might be involved in scientific activities.

The scientific co-operation at INPA is usually part of broad agreements between the relevant country and Brazil. The scientific co-operation between Brazil and France, for instance, is part of a broad cultural, scientific and technological agreement between the two countries. Apart from the agreement with the Institute, ORSTOM, one of the French organisations contacted in this research, has programmes

involving many other Brazilian institutions. Within this broad agreement, more specific ones are set up between interested organisations in each country. The details of these specific agreements between scientific organisations are commonly found in documents called *Convênios*, which are documents generally used for specific agreements or contracts between public organisations. The *Convênios* are similar to contracts but with a specific name to distinguish them from contracts made with private companies, whereas *Convênios* are used only between governmental institutions.

In such cases, these *Convênios* usually name the institutions involved, define the activities of each institution involved in the co-operation, describe the activities involved in the project, and give the project timetable. Usually the broader agreements between the countries involved in scientific co-operation specify that each government is responsible for 50% of the financial resources necessary to implement and develop the project itself. Thus, in scientific co-operation, each side is responsible for the expenditures (personnel, financial, material, etc.) incurred by its part to facilitate their participation in the project. Thus, the participation of an international agency usually requires the commitment of sufficient scientists and financial resources to develop its part of the project.

In Brazil the governmental organisation responsible for the general management of such Scientific Co-operation is CNPq which is also one of the main institutions that funds scientific programmes. CNPq is a council which falls under the jurisdiction of the Ministry of Science and Technology. On the other hand, the management and administration of activities related to the submission, analysis and approval of Technical Co-operation is made by another Brazilian institution called ABC - Brazilian Co-operation Agency (*Agência Brasileira de Cooperação*).

The CNPq and ABC offices are located in Brasilia. The distance between these institutions and INPA sometimes makes effective communication between them difficult and may also inhibit the participation of the Institute in the decision-making process.

The general managerial activities of CNPq involve the analysis, approval and evaluation of these international programmes. The evaluations are carried out by a

group of consultants who work for the organisation. These professionals usually have a background in the specific area of the scientific programmes under scrutiny. The consultants receive annual reports on the performance of the programme. They monitor progress through the stages already completed according to the objectives of the project, checking whether the timetable has been followed and the project has generated the expected results.

Sometimes a similar procedure is also undertaken by the international agencies involved in the programmes of co-operation. At the French organisation, ORSTOM, for instance, they also undertake a comprehensive evaluation of their projects each year. These scientific evaluations usually take place when the allocation of resources for the following year is being discussed at the organisation. The allocation of funding for the following year depends on the achievement of the expected results. In cases where problems arise, they are diagnosed during the evaluation stage. This can result in reductions or increases in the number of researchers or in the budget, as they evaluate alternative actions that could help increase the efficiency of the projects. Some of the projects are designed to be completed in a three-year period. By the end of the third year, final reports are submitted and a broader evaluation of the project, including the analysis of the achievement of the expected results is carried out. The output of the project is considered and public meetings are usually held to present the results. The size and importance of the audience depends on the institutions involved and on the size and importance of the project.

Co-operation with Japan is administered by JICA. According to the interview respondent the co-operation is part of a broad technical co-operation agreement which governs all such co-operation between Brazil and Japan. With the Institute, a more specific agreement was designed, based on the more general one. This agreement started in 1995. Despite the fact that the agreement is defined as a technical co-operation project with INPA, it seems to have the characteristics of a scientific undertaking. One of the characteristics of the JICA projects, according to the interviewee, is that generally it does not have more than one project with each organisation.

The co-operation between the Brazilian and British governments at the Institute is

usually carried out through the ODA. There is scientific co-operation with the British government, but the nature of the collaboration in the Excellence Programme involving the ODA is technical. This means that the ODA collaboration in the Excellence Programme consists of training, materials and equipment, technical assistance, and support for the design of material that explains the Institute's findings to the public.

One of the characteristics of the technical co-operation of the ODA assistance in the Excellence Programme is that it is not a scientific programme, and that it is thus not subject to the restrictions of scientific project funding. However, it seems that this programme has been directed much more towards the administrative than to the scientific aspects of the Institute, so it is thus characterised by managerial activities. The next section will give a detailed description of the organisations involved in this study.

The international context

Before analysing remarks made during the interviews by the international agents of the organisations described above, it is necessary to analyse certain aspects of the countries to which the international organisations involved in this study belong, in relation to the assistance they give to developing countries.

The interaction of these organisations with INPA is sometimes through scientific co-operation as well as through aid projects. Thus, the activities of these organisations were related to scientific areas (research) as well as to bureaucratic areas (aid), as illustrated in Table 11. They were all organisations from major western European countries, Japan or America. They were made up of agencies from France (CIRAD and ORSTOM), Germany (*Max-Planck-Institut fur Limnologie*), Japan (JICA), Great Britain (ODA) and an intergovernmental organisation (The World Bank).

Table 11 - International Agencies Areas of Domination

ORGANISATION	COUNTRY	SCIENTIFIC DOMINATION	BUREAUCRATIC DOMINATION
		RESEARCH	AID
MAX PLANCK	Germany	X	
CIRAD	France	X	
ORSTOM	France	X	
JICA	Japan	X	
ODA	Great Britain	X	
IBRD	International		X

Co-operation with the Institute occurs in different ways including: scientific projects, scientific publications, technical co-operation, organisational improvement, and collaboration between individual researchers, departments, institutions or countries. Four of these organisations link to the Institute mainly through scientific research projects (Max Planck, CIRAD, ORSTOM, JICA). The contact with IBRD is through an aid project, namely the Excellence Programme and the connection with ODA is through both scientific and aid projects. The following sections describe in turn each of these organisations' links with INPA.

Max-Planck-Institute

For a long time (around 30 years), some scientific activities going on in the Institute have involved German scientists. These scientific activities are a part of a project entitled Studies on Human Impact on Forests and Floodplains in the Tropics - SHIFT (CNPQ/BMBF, 1995) involving the Max-Planck Institute (*Max-Planck-Institut fur Limnologie*). This project is part of the German Federal Ministry for Research and Technology (*Bundesministerium fur Bildung, Wissenschaft, Forschung und*

Technologie - BMBF) strategy to develop more co-operation on "environmental research projects [...] promoting projects in tropical ecology" (CNPQ/BMBF, 1995). The development of the scientific activities involved in these programmes of co-operation between Brazil and Germany is based on a broad agreement between the two governments.

The SHIFT programme mentioned above is intended to study the functions of tropical ecosystems, and their stability and limits as results of human impact (BMBF, 1992). According to this publication (BMBF, 1992) "the research activities within the SHIFT programme are selected and implemented in close co-ordination and co-operation with the partner countries in the tropics, in this case Brazil, taking into consideration their existing research and development strategies and also referring to existing scientific structures".

Included in the SHIFT programme are projects involving the *Max-Planck-Institut fur Limnologie*. There are three scientific research projects undertaken in co-operation with the Institute. These are: the Neotropic inundated forest: relation between fish and environment; economic assessment of different types of land use and analysis of their impact on the ecosystem of floodplains in Central Amazon/Brazil; and biomass, primary production and photosynthesis in Amazonian forest and floodplains (MCT/INPA, 1996).

According to information on the Institutional homepage (http://www.mpg.de) the *Max-Planck-Institut fur Limnologie* is directly linked to the Biology and Medicine Section of the Max Planck Society for the Advancement of Science. The Max Planck Society is basically a scientific entity and a non-profit research institution founded in 1948. Its administrative headquarters are located in Munich. The Max Planck Society is a very large organisation with approximately 80 institutes employing around 10.700 people.

CIRAD - Centre de Co-operation Internationale en Recherche Agronomique pour le Developpement

As stated in its publicity material, CIRAD is a French state-owned research institution specialising in tropical and subtropical agriculture. It was established with the aim of contributing to the economic development of such regions through

research, training, and the dissemination of scientific and technical knowledge. The Centre develops its works through its own research centres, national agricultural research systems, or development projects (CIRAD, 1996).

CIRAD was founded in 1984 as a result of the merger of French agricultural, veterinary, forestry, and food technology research institutions for the tropics and subtropics. The organisation is made up of seven departments: Annual Crops; Tree Crops; Fruit and Horticultural Crops; Livestock Production and Veterinary Medicine; Forestry, Food Technology and Rural Systems; and Management, Common Services and Laboratories, Documentation (CIRAD, 1996).

The Centre employs approximately 1,800 people, including around 900 senior staff, working in about 50 countries (CIRAD, 1996). Its headquarters is located in Paris, France. Another main office is located in Montpellier. It also has 7 centres in French overseas departments and territories located in French Guyana, French Polynesia, Guadeloupe, Martinique, Mayotte, New Caledonia and Reunion; as well as offices in 33 other countries, including Brazil. In Brazil they have more than 25 people working in different regions of the country. The organisation used to be involved with INPA under a scientific co-operation programme. At the time of the interview their current scientific projects were being concluded and the proposals for new ones were being analysed by the Brazilian government.

ORSTOM - Institut Francais de Recherche Scientifique por le Developpement en Co-operation.

A second French organisation involved with the Institute through research projects is ORSTOM - *Institut Francais de Recherche Scientifique por le Developpement en Co-operation*, a public organisation with scientific and technological characteristics, linked to the French ministries responsible for research and co-operation. This Institute has been working in research for more than 50 years (ORSTOM, 1996a).

The French institute has 5 departments which cover 27 research units, as well as around 54 representative bodies world-wide. The organisation employs around 2500 people. ORSTOM was created, with a different name and purposes, in 1845. At that time its objectives were to study the economic potential of French colonies. Nowadays, according to its own publications, the Institute participates in the

development of research programmes in the tropics in co-operation with other national or international scientific institutions (ORSTOM, 1996a). Of the two French institutions contacted in this study, ORSTOM seems to have a bigger structure than CIRAD. The activities of ORSTOM in Brazil consist of 16 research programmes, which, in 1996, involved around 40 people.

The co-operation with INPA, included in its "*Convênio*" (type of public contract) with CNPq (National Research Council), which is the Brazilian agency responsible for the general administration of the project, started in 1979. According to the document (*ORSTOM/Brazil: Mais de trinta anos de cooperação científica*, 1996b), the objectives of this programme are the development of scientific co-operation, the development of research projects in collaboration with the Institute and the dissemination of the scientific knowledge obtained as a result of this co-operation.

JICA - Japan International Co-operation Agency

JICA, a Japanese publicly funded body, was established in 1974 under the International Co-operation Agency Law and specialises in promoting international co-operation through the provision of overseas development assistance. The Agency's activities are administered by the Ministry of Agriculture, Forestry, and Fisheries; the Ministry of Foreign Affairs, and the Ministry of International Trade and Industry (Japan, 1993). According to Selim (1983) "the funds required by JICA for carrying out its technical co-operation activities are budgeted by the Japanese Government under its ODA (*Official Development Assistance*) programme". According to that source "co-operation in social development, agriculture and forestry, and mining and manufacturing was inaugurated in August 1974, when JICA was established, as a new area of Japan's international co-operation activities, not previously undertaken by the agency's predecessors, the Overseas Technical Co-operation Agency and the Japan Emigration Service".

The Agency's main office is located in Tokyo, with other internal offices and subsidiary agencies spread around the country. It also has 49 offices world-wide. The number of employees in 1990 was 1,030, including 200 working abroad (Japan, 1993).

According to an encyclopaedia (Japan, 1993) the organisation's main activities are not only related to scientific development, but also include the:

- strengthening of technical assistance to third world countries, through the Japanese government, which includes: bringing technical trainees to Japan, sending their own specialists to other countries, and providing necessary material and equipment for international projects;
- administration of grant assistance programmes;
- co-ordination of loans related to development projects;
- assistance of Japanese emigration abroad.

The contact between JICA and INPA is through a scientific research project which is a recent initiative between this organisation and the Institute.

ODA - Overseas Development Administration

The British organisation contacted for the purpose of this study was a government department formerly called the Overseas Development Administration (ODA). During the period of this research it became the Department for International Development (DFID) in 1997. In this study the name ODA will be used, as it was the name by which the organisation was known for most of the research project. As stated in its booklet (ODA, 1992) the organisation "is responsible for Britain's overseas aid to developing countries, for global environmental assistance, and for assistance to Eastern Europe and the Soviet Union". As far as the environment is concerned, it also states that British assistance is intended to guarantee that the environment is protected and that development is done in a sustainable way to preserve the environment for this and generations to come.

The organisational mission is to help people from developing countries to have a higher standard of life. The agency aim is "to encourage sound development policies, efficient markets and good government; to help people achieve better health, education, and to widen opportunities - particularly for women; to enhance productive capacity and conserve the environment; and promote international

policies for sustainable development and enhance the effectiveness of multilateral institutions" (ODA, 1996).

The agency has links with INPA through the funding of scientific research projects and the financing of part of the Excellence Programme. It is interesting to note that the funding from ODA for the Centres of Excellence Programme, which is included in the PPG-7, was allocated for specific purposes. For example, the investment was made directly from the ODA's resources to the Institute specifically for technical co-operation. The investment in the project from the British Government through the ODA was then much more specific in the PPG-7 than that of the other supporting countries. It had a more detailed design and a greater definition of the outcomes, and was evaluated in independent reports. This could certainly allow the ODA to have more control over the outcomes of the project. This technical co-operation included technical visits and scientific training, development of material for dissemination, specific technical equipment, and training in the use of scientific collections to develop knowledge (World Bank, 1994).

The main office of the agency, which is located in London, is responsible for the general administration of the organisation. There is a section of the agency in Brazil , which is based in the British Council office in Brasilia.

IBRD - The International Bank for Reconstruction and Development (The World Bank)

The International Bank for Reconstruction and Development (IBRD) was "the original institution of what is now the World Bank Group" (Payer, 1982). As stated in its report (World Bank, 1977), three organisations, namely the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA) and the International Finance Corporation (IFC), form this group.

It was founded in 1945, following the Bretton Woods conference in 1944 (Payer, 1982). According to Leslie (1987), at the time of its creation one of the most important issues was to recover the stability of the global economy given the economic problems of the post-war period. Thus, many investments were initially made in Europe. However, since its creation the Bank has undergone several changes to adapt to emerging circumstances. The setting-up of the Marshall Plan, an

American aid programme which was an important step in funding recovery of European countries, largely influenced a new move of the Bank to finance development projects in less developed countries. Also the creation of the IFC (International Finance Corporation) in 1956 and the IDA (International Development Association) in 1960 strongly influenced the transformation of the Bank into a development agency

In development funding "the Bank chose to concentrate on investments in traditional sectors such as infrastructure, transportation, and energy, arguing that development in these areas constituted the necessary foundation on which strong viable economies could be built" (Leslie, 1987). The Bank has largely financed different types of structural investments like electric power, roads, railways, telecommunications, agriculture, education, urbanisation and development programmes (World Bank, 1976). The first loan to Brazil for a specific project, which turned out to be a preferential Bank loan, was in 1949, a year after the first project loan, which was made to Chile (Payer, 1982).

The Bank's headquarters are located in Washington, U.S.A, with offices or representatives world-wide. At the top of its structure the World Bank has a Board of Governors, formed by representatives of its member countries, who are responsible for running the institution. However, the president and the executive directors are responsible for the conduct of the routine activities. A great deal of influence over the Bank management comes from the international environment and especially the United States. The fact that the US has a large number of representatives on the Bank's board, that there has always been an American citizen as its president and the influence of the country's economy on the institution may be some of the points which cause this influence (Payer, 1982).

Despite the Bank's efforts to decentralise its functions "the Bank remains extremely centralised, with a functional division between project and area departments. All stages of the project cycle are managed from Washington, D.C." (Payer, 1982), although there are field missions carried out by the Bank staff in borrowing countries and in some cases more general activities are carried out by staff located in those countries. According to Payer the Bank's loans and credits are usually project-tied.

These projects frequently involve large investments.

As far as lending is concerned, Payer (1982) points out that "well over 90 percent of the loans and credit made by the Bank and IDA are made for specific projects". They usually follow six basic steps, called the "project cycle", covering identification, preparation, appraisal, negotiations, implementation and supervision and evaluation. The Bank's interest in project quality made it start to help the borrowing country to prepare suitable projects to finance although in some cases the Bank develops them itself (Payer, 1982). According to the author "today project selection is made within the context of Country Economic Surveys prepared by the Bank for each borrowing country, which identify the priority sectors for investments".

During the appraisal stage the "Bank staff review, comprehensively and systematically, all aspects of the project" covering "technical, institutional, economic and financial" aspects, resulting in an "appraisal report ... prepared (by the) Bank staff (which) serves as the basis for negotiations with the borrower". During negotiations, discussions are conducted with the borrowing country "on the measures needed to ensure success for the project". If approved, the "loan or credit is formalised by a loan agreement" and then the project can be implemented (Payer, 1982). In the evaluation stage, concerns are mainly with time and "cost overruns on the project, whether the anticipated rate of return has been achieved, rather than on the broader social questions" (Payer, 1982)

Many criticisms of the World Bank have been addressed in various works (Leslie, 1987; Payer, 1982; Hayter 1971; Hayter, 1985; Stern and Ferreira, 1993). Among those criticisms is the impact which projects financed by the Bank have had on the environment. Accordingly Stern and Ferreira (1993) point out that:

> "by the mid-1980s the Bank was being criticised heavily for the environmental effects of its projects, for example of dams and their effects on local water systems, and of road construction in contributing to the exploitation and reduction of rain forests"

The authors also add that:

> "an environment department was not established in the Bank until 1987,

> long after it had become a major issue both politically and in the academic world. The Bank also has often appeared to respond to environmental issues only reluctantly, seeing them as political irritants that get in the way of making the project loans which managers see as their prime commitment ... the establishment of the Environment Department was, therefore, largely a response to external pressure... "

Despite the fact that the Bank has made some efforts to improve its performance in the environmental area (Redwood, 1993), the *POLONOROESTE* project as well as the construction of the *Transamazônica* (a long highway in the North of Brazil) exemplify the criticisms expressed by Searle (1987) and Payer (1982) about the Bank's activities. According to the authors, these projects had adverse effects on indigenous populations and resulted in deforestation and uncontrolled migration.

Following the growth of a movement demanding the conservation of the environment, the Bank was chosen by the supporters of the Pilot Program to Conserve the Brazilian Rain Forest (PPG-7) to be responsible for the administration of the financial resources of the Rain Forest Trust Fund (RTF). The Centres of Excellence Component of the Science and Technology sub-programme forms part of this. The INPA Excellence Programme is part of a component of the PPG-7. The PPG-7 (Brazil, 1996) "represents a pioneer experimental learning process. It has resulted in greater environmental awareness, with the involvement of communities in Brazil and abroad. The PPG-7 proposes to seek improved quality of life for the traditional population of the tropical forests of Brazil ... It is the result of a joint effort on the part of the Group of Seven countries, the Government of Brazil and the European Union, amply supported by their respective societies, with the World Bank as administrator of the financial resources of the Rain Forest Trust Fund (RTF)".

The contribution of resources to the Centres of Excellence Programme by donor countries, according to a 1996 publication of the Ministry of Environment, Water Resources and the Amazon (MMA, 1996), is shown in Table 12. The organisations involved in this study which have been most closely involved with the Excellence Programme are IBRD and ODA. The other institutions' involvement with INPA is basically through scientific programmes.

Table 12 - Availability of funds, grants and co-financing to the Centres of Excellence Programme (1996)

Project/ Sub-programme	Rain Forest Trust Fund	United States	United Kingdom	Brazilian Government	TOTAL (US$)
Centres of Excellence	9.000.000	2.000.000	460.424	2.600.000	14.789.000

Source: MMA (1996).

The World Bank controls the activities of the Excellence Programme in the Institute by making mission visits to INPA and by producing periodic reports which follow a standard format of World Bank documentation.

A Brief Analysis of Motivation for Working in Collaboration

In this part of this work I shall concentrate more on the performance of the relevant countries in relation to aid activities in general, rather than specifically on the character of their scientific collaboration.

Just as motivation for German aid seems to be related to economic interests, Japanese aid had also always been characterised as being heavily influenced by commercial considerations (McNeill, 1981). Although the Japanese aid programme "has become less dominated by narrow and straightforward commercial and economic interests ... these continue to be important" (Burnell, 1997). Their economic co-operation is believed to be important to the long-term development of the Japanese economy (Selim, 1983).

Selim (1983) argues that "the purpose of Japan's economic co-operation with the developing countries is to facilitate their self-help efforts and promote their economic and social development, to enhance the welfare of the people as a result of such development, and thus to stabilise the people's livelihood", however it is observed by Burnell (1997) that the Japanese "aid programme will ... continue to bear witness to narrower economic interests, notwithstanding the Ministry of Foreign Affairs' growing concern to display commitment to a stable international economic and political order more generally".

Furthermore, the motivations for the Japanese aid programme may also include three other reasons: promotion of its exports, the Government's need to assure Japanese good faith in relation to the industrial nations of the West and its political influence over Asia (White, 1964).

On the other hand, French co-operation is characterised by its long tradition in working with other French-speaking countries. In analysing the application of aid, Selim (1983) argues that a large amount of the country's aid is given to the technical assistance sector, mainly the cultural and educational area, and this could only be attributed to "France's well-known determination to promote its language and culture as widely as possible". Following this practice in their ex-colonies, the French government has also extended its investments to many developing countries such as Brazil.

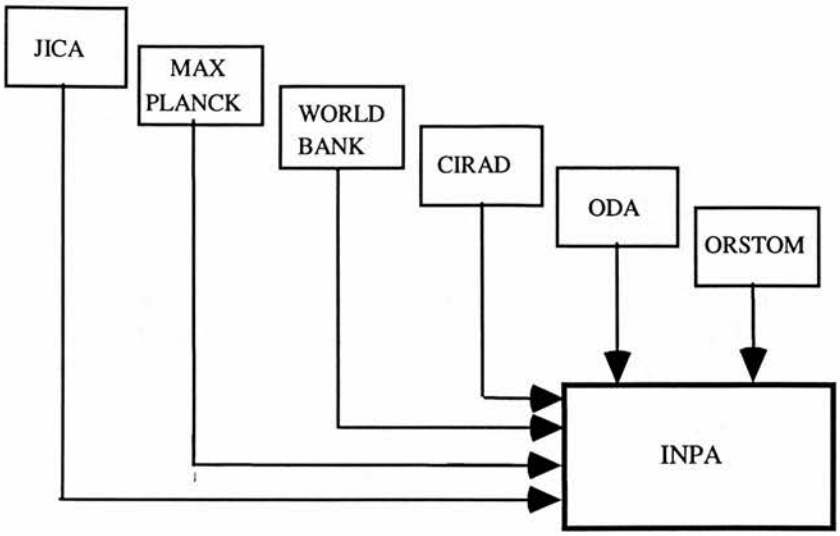
The motivation for American aid, however, has sometimes been linked with the country's national security aspects. As an example Zimmerman (1993) argues that "the primary purpose of US economic assistance is to support the diplomatic processes that promote overall US foreign policy objectives".

Institutional evaluation

The specific location of a research institute designed to develop environmental and biological scientific knowledge in the middle of the Amazon region may be of great importance. Given the bio-diversity of the environment of the region in which the organisation is located, these characteristics may be a source of attraction to some sections of the scientific community.

The initial aim of this section is to provide an idea of the degree of familiarity that the people from the international agencies contacted have had with the Institute, which can be seen in Figure 3. As can be observed, the person contacted from ORSTOM was the one with the greatest familiarity and closest contact with the Institute. On the other hand the person from JICA was the one who had least contact with INPA. This diagram is included to help evaluate the type of comments made by the interviewees. These could be related to the level of their contact with the Institute.

Figure 3 - Level of familiarity



The development of a programme intended to improve the performance of the Institute is one strong indication that it had not been realising its full potential and some changes in the way it had been working needed to be made.

An account of one of the first evaluations of the Institute, which was carried out during the early stages of this changing process, can be observed in the next extract (World Bank, 1994:5):

> "In May 1992, in response to a request from the Brazilian government, the US National Research Council of the National Academy of Sciences selected a Scientific Advisory Group to assist the Brazilian government with an assessment of INPA and MPEG and to identify actions and needs for developing these institutions as model Science Centers in the Amazon region. The major deficiencies found by the Advisory Group were: (I) lack of clear institutional guidelines and focused research goals; (ii) low salaries and exodus of the most qualified staff; (iii) lack of efficiency in research administration; (iv) lack of co-ordination with other institutions; (v) deteriorated infrastructure and lack of facilities for field research; (vi) lack of necessary equipment; and (vii) lack of a performance evaluation system. The Advisory Group recommended that the two Centers undertake through a strategic planning exercise to address some of these deficiencies and strengthen the institutions."

The result of that evaluation of the overall performance of the Institute identifies a number of deficiencies. The Institute's performance was frequently criticised by people from international agencies as well as by people within the Institute during the interviews. This section will present an evaluation of INPA, as well as comments and criticisms mainly made by people from outside the Institute.

Scientific aspects

Concerns related to the evaluation of the scientific management of the Institute were expressed by respondents. In addition to the evaluation mentioned above, a further evaluation of the organisation was developed by Tundisi (1994), a renowned Brazilian scientist, who was head of CNPq in the late 90's. The author analysed several aspects of the organisation including research lines, important research areas, qualification of researchers, postgraduate courses, publications, and infrastructure. In relation to research lines he observed that:

> "the Institute has a great number of research lines, with few researchers in each of these areas and without much connection between them. This dispersion of activities generates a great scattering of public resources and little scientific consistency"

The evaluation presented a strong criticism of the scientific organisation of the Institute which resonates with other data presented in this thesis. As far as the outcomes of the work of the Institute are concerned, one critical comment about the scientists of INPA and their work, was made by Henrique, the senior researcher from ODA, when speaking about excellence:

> "A centre of excellence means a guarantee that its products are of the best quality, and at this moment the Institution does not meet these standards. There are good researchers, with international competence, I am sure of that. However the Institution as a whole does not reach the required standard."

The respondent expresses criticisms related to the quality of the work developed at the Institute. In addition to his criticisms about the Institute, on the same lines Ricardo continues expressing his views about the quality of the scientific publication adding that:

> "some of the outcomes of the research projects are not of an international level. They are published in internal journals and are not of high enough quality to be published in international journals such as Nature"

As far as the institutional human resources are concerned Tundisi (1994) evaluated the Institute's scientific team at that time,and he says that:

> "Of the 320 researchers currently working at the Institute, 87 have a doctoral degree. Only 60% of them have supervision or lecturing responsibilities, and the remaining 40% have no involvement whatsoever in postgraduate activities. Only 10 or 15 researchers operate at an international level and only 30 to 35 could be considered good. Rarely do researchers participate in international scientific conferences"

He adds that:

> "there is a great need for: reform of researchers' career structure; improved salaries; better productivity incentives; and better doctoral training in Brazil and abroad"

As can be seen, there were 320 researchers at the Institute at that time (1994). The 1997 institutional report shows that the number of scientists had declined from 320 to 238. It is interesting to observe the respondents' criticisms in relation to the Institute, pointing out that they present significant deficiencies in relation to the overall quality of the Institute, its scientific publications and its staff.

Some of the criticisms of the institute were also related to its scientific management. The person from ORSTOM that I contacted, Flavio, who has had very close links with the organisation, observed that:

> "what I have seen at INPA is that they lack scientific management ... if they had this it would probably lead to closer co-operation between their different research units, labs and groups ... The institution lacks real scientific management because, after Dr. Kerr, it no longer had a competent director, who was capable of defining clearly what INPA should do and what its priorities should be, because INPA cannot do everything ... it needs to set limits according to its capacities and its competence in some areas"

On the other hand a different point of view in relation to the Institute was expressed by one of the government officials interviewed in Brasilia. This participant, Marcio, who has some links to INPA through the Excellence Programme, expresses his view, emphasising that:

> "the institutions were chosen because they are the ones with the longest tradition of working in the Amazon, specifically in research in the Amazon, environmental research ... they are the most experienced ones ... they are very experienced"

In the above extract the interviewee seems very enthusiastic about the chosen institutions, which were receiving support for their improvement through the Excellence Programme. These institutions were INPA and the Emilio Goeldi Museum, another government institution, whose work is more anthropological than that developed at INPA. In contrast to the government representative, the other comments made by Tundisi, and people from the French and British organisations express strong criticisms of the Institute. It is interesting to observe the different opinions about the organisation expressed by them. The close involvement which the person from the government has had with the Institute may be one of the reasons why he is less critical of it than the opposing view of the person from ODA. The relationship of the latter with the Institute as an outsider may provide the necessary distance which enables him to see things more critically and objectively.

Attending Demands Directed to the Institute

One common criticism in the interviews concerned the demands which the Institute could meet. It is interesting to observe that some of the criticisms of the Institute made by segments of the local society were shared by people from international agencies and from government representatives. Commenting on the objectives of the Excellence Programme and the need to pay attention to demands, Henrique says that:

> "one of the objectives is to change the way in which the institutions organise, plan and prioritise the research projects. They need to plan and co-operate scientifically in a way which is more related to the needs of the region"

The same sort of observation is also made by Rogerio, one of the government

officials from Brasilia who explains that:

> "I do not think that Science and Technology are detached from the rest of society. You cannot have an institution which is seen by society as a strange organisation ... you cannot have an institution which does not have strong ties with society, it has to be constantly in tune with the demands of all sectors - government, state, industry. There are many people in science and technology who become upset when people speak about business ... those ideological questions, you know ... But I think it is necessary to break the ice in the relationship between research and the productive sector of the economy... It can not be an alienated institution which thinks that its sole objective is to generate scientific knowledge. That is an important mission, one of the most important, but it is not the only one. It is important to look for ways in which this institution can begin to have a significant role in the dissemination of scientific knowledge and in finding solutions for local problems"

In addition, Henrique from the ODA also cites criticisms which are made from other parts of society:

> "INPA is subject to a lot of criticism, even from local government politicians, focusing on the fact that its work is not relevant to the Amazon state. Questions are being asked about what benefits it has been producing for the Amazon. But now the Institute is trying to make some changes in order to come closer to the local community. It has developed the "*Bosque da Ciência*" (type of botanical garden), which the community can visit and it is also trying to develop research which could generate useful results for the region - and not only research about the taxonomy of orchids"

In the previous extract Rogerio emphasises the resistance of scientists to developing their scientific work in a more economically orientated perspective. However, Henrique seems to express the view that changes need to be made at the organisation. Things have been done in the Institute in ways which certainly need to be changed and, according to him, one of the reasons may be that:

> "in the past researchers themselves used to choose the subject of their

> research, and start looking for funding, without relating it to the needs of the local community"

On this matter Rafael, the interviewee from JICA, the Japanese organisation, mentions that:

> "in Brazil research is not always related to the needs of the local people or to the needs of the country. Sometimes research is undertaken only because a researcher is interested in the subject, without considering whether or not it will have any impact socially or economically."

Henrique suggests that some action could be taken to improve this situation, thus he adds that:

> "it is necessary to commission and conduct more research and to give more incentives to researchers. At INPA for instance there is not an individual performance appraisal system. An attempt is being made to introduce it now, but researchers can research anything they want, and nobody can control it or question why the research is being undertaken."

The concern about the need to attend to the demands of society seems to be shared by people interviewed from the international agencies as well as by those from government. This is an important issue that was also raised by respondents of the Institute, as seen in Chapter 5. The next section discusses some issues raised by respondents in relation to human resources management at the Institute.

Human resources

While discussing aspects of the situation at INPA personnel, it is worth mentioning that one of the characteristics of the Brazilian government's administrative system is that it imposes many constraints on the management of personnel in public organisations. One such constraint according to interviewees relates to the payment of salaries to people with specialised jobs, such as scientists. The Excellence Programme is often seen as a potential resolution of many of the problems which the Institute has had. As an example, a strong criticism of the situation of the scientists in the Institute was expressed by Flavio, who observed that:

> "I think this *(project)* is a good opportunity for INPA ... it is necessary to provide additional motivation to work in the middle of the Amazon ... and with all those obstacles it was not the best employees who stayed at INPA, because they did not have the motivation of higher salaries, like those at EMBRAPA, where the salaries of the scientists are higher. It is an important thing to have a good group of scientists"

This case mentioned salaries at EMBRAPA, and is one example of differences in earnings between people working in different public organisations. EMBRAPA (Agricultural Research Institution) is a government organisation, set up in 1973, with several branches in most of the main cities in different parts of Brazil. The organisation has around 9,700 employees (EMBRAPA, 1973) and, like INPA, employs a large number of researchers. Sometimes people performing the same kind of work are paid differently depending, as in this specific situation, on the institution to which they are subordinated. This is a common situation which happens despite the fact that the Brazilian legislation for labour in the civil service specifies that people doing the same kind of work should receive the same salary. Clearly, this is another example of formalism in public administration.

A few years ago, as an incentive for people who work in less developed or more distant regions of the country, like in the Northern region, the Government set up a form of benefit for people in the public service called "*Gratificação de Localidade*" (Regional Benefit). This incentive is usually paid to people working in the branch of EMBRAPA located in the same region as INPA, whereas INPA's employees generally do not receive it. This, among other things, could be one of the reasons for the differences in salaries paid to people in those organisations.

It is also interesting to note the observation of the interviewee that "additional motivation" is needed to work in the Amazon region. Brazil is the seventh largest country in the world and the Amazon is also characterised as being a huge region. One interesting demonstration in relation to those regional differences in a scientific context within the same country, was made by Antonio, in Chapter 1, who had experience in developing scientific work in other regions of Brazil.

With respect to the difficulties in working in the Amazon region, many other aspects

can also be added, such as: the distance of the region from the main cities located in the South of the country, the higher standard of living in the South, the low level of government investment in science and technology, as well as in agriculture, which results in many products having to be imported at increased cost.

Government investment in science and technology in Brazil is usually very low and much of this investment goes to better structured institutions in the South of the country. This situation creates a great disparity between institutions located in the North, and in the South, where they are usually more structured and can offer better work opportunities. As an example Flavio suggests that:

> "if they want to become a Centre of Excellence they need to give a boost to the research projects, because there are many deficiencies. It is clear that these institutions were coming from a period of decline, mainly because of a lack of financial resources and also because for a long time central government had been blocking the recruitment of new scientists. The most famous scientists who worked in the Institute at the time that Dr. Kerr was the director, which is the time when the Institute was most prominent, are all gone, because several factors including the low salaries and the difficulties of the region. A lot of them have gone and new ones were not recruited".

They mention that, for a variety of reasons many good Brazilian scientists have left the Institute to find better salaries and conditions of work. Previously the development of the research activities of INPA relied heavily on central government funding and indeed, for a long time, this was the main source of funding for the development of research at the Institute. This public funding was at times very irregular, creating a lot of difficulties for the development of the Institute's activities. In this situation, projects involving international institutions are often seen as a good opportunity to access research funding. These international groups generally have regular funding throughout their projects and have the required structure to carry out their research.

Hence, the problem with low salaries and work conditions has certainly contributed to the shortage of staff over the years. The opportunities for higher salaries and better conditions in other universities or research institutions in the Amazon or in the South

of the country, where better structured and funded organisations are located, has persuaded many good scientists to leave the Institute.

One further question related to the Brazilian government is its personnel system. As mentioned earlier, the national personnel system set up in 1990, defines the main regulations for personnel management of the Brazilian civil service. The system is intended to set general norms regarding personnel management for the whole civil service in Brazil in terms of admission, leave, transfer, retirement and so forth. As a public organisation, the Institute is also subject to these regulations. They do not allow much flexibility for institutions and can therefore cause problems.

Thus, the Institute is thwarted by the current institutional wage system. One example of the type of problem generated by this centralised, tight system of administration was mentioned during interviews, namely, that, in trying to "solve" the problem of low wages, by trying to increase the level of remuneration, many researchers in the Institute are already, in terms of salaries, at the top of their career. It was impossible to pay researchers more highly because they were already at the top of their salary scales and no flexibility was available to address this situation. The comments mentioned in this section have expressed the critical views of respondents in relation to the Institute. The next section will present some additional concerns of respondents regarding the Institute.

International Agents' Concerns

In addition to the evaluation provided in the previous section, international respondents pointed out that there are major obstacles that may interfere strongly in the process of the improvement of the quality of work undertaken by the Institute. These concerns included, among others, the quality of institutional scientific management, the implementation of the Science Centers project and achievement of its objectives, the criteria for the allocation of financial resources and the need to focus the development of scientific knowledge on local problems. In the following paragraphs some of the concerns discussed during the interviews are going to be highlighted.

Some basic questions about the project were raised in the interviews. Henrique from the ODA argued that:

> "to speak frankly I do not know what a centre of excellence is. The idea, I think, is strange. I can understand the need to strengthen the organisation, to improve the quality of work of the institution, but I do not know exactly what a centre of excellence is. Furthermore, the choice of these two institutions, Emilio Goeldi Museum and INPA, is an obvious one, isn't it? They did not have criteria to choose these 2 institutions. I think that there are other institutions in the region, where they have areas of greater competence e.g. the institutes of EMBRAPA (Brazilian Agricultural Research Institution), the CPATU (Eastern Amazon Agricultural Research Centre). Goeldi Museum and INPA were chosen because they are subordinate to MCT (Ministry of Science and Technology) and the project has been co-ordinated by this Ministry, so I agree with the aim of strengthening the two institutions but I do not understand what a centre of excellence is"

Besides this clear argument about whether or not these investments should be given to the Institute, some factors that had been affecting the implementation of the Excellence Programme were also mentioned. In relation to these aspects, Felipe a senior researcher and middle manager from the World Bank mentioned that:

> "I think that there is at least one very important obstacle to the achievement of the objective, of the main goal of this project, to create Excellence Centres. This obstacle is related to the personnel policies of the institutions. The project is intended to strengthen the organisations but it does not have enough mechanisms to do this. This raises a broader issue within the Brazilian government - civil service policies. The problem is the difficulty of recruiting and dismissing people. It is very difficult to make changes in the pay-scale, so you have a situation which there is no motivation for the researchers to perform better in the government institutions"

This participant from the World Bank had strong views about the rigid government policies for the civil service. He adds that:

> "it is through recruitment and the flexibility to dismiss people who are not producing satisfactorily, that it is possible to transform organisations, and that is not happening (there)"

In general terms there has always been some form of resistance to change in organisations. This is a characteristic which is often observed in institutional change processes. In the case of INPA, Felipe points out that:

> "there were attempts to create a "strategic planning culture" and there was and still is a lot of resistance to this. When we speak about strategic planning we have to ask which are the areas which offer more potential in the institution and which are less efficient, or which are less capable of increasing their productivity. Then you make strategic choices, and choose the areas which the institution wants to strengthen, the ones which might eventually disappear and those which have to stay as they are. But this has never happened"

Another criticism mentioned by the international representative from ODA was related to their financial aspects of the project and problems with using the resources available. Those problems, Henrique says, are related to the bureaucracy in the disbursement of the financial resources from the project as well as to the capacity of the Institute to apply it. As he points out:

> "there is an intricate bureaucracy in the disbursement of the financial resources. But I also think that the capacity of the Institute in applying efficiently the financial resources is limited and that makes it complicated"

Henrique continues adding that:

> "the total amount will be a big investment in the organisation which has had a shortage in its budget and its human resources. It is difficult to use this amount in a reasonable time, because there are not many people in the administrative area. The organisation cannot use the resources quickly. Furthermore, the objective of the project is not just to optimise the Institution in terms of infrastructure and equipment but also in human resources, in planning and in the utilisation of the Institution's resources ... It needs a planning process and changes in behaviour which are things that takes time".

The institute's difficulties in getting adequate staff for stating the criteria in setting priorities was also mentioned as one reason for the inability to use resources well to make investments which would have positive impact on scientific development.

Although criticisms of the capacity of the institute's administrative staff were often made, there was some controversy between participants from government and international groups about the competence of research staff. Among people from government the large potential and size of the Institute was sometimes pointed out enthusiastically. However the same was not said by people from international agencies. Furthermore, some participants agreed that there were some competent individuals within the institute whereas others did not even mention that.

Some questions had been raised about the connection between financial resources and scientific productivity and the quality of that scientific productivity. On this subject people from international agencies have raised concerns about the implementation of the project itself as well as about the expenditure of resources. As Felipe points out:

> "it seems that some of the expenditure is not clearly connected to scientific production. They stated as priorities that they wanted to invest in buildings, and that is one thing that is relatively easy to finance in a project because it is going to generate visible impact quickly. However, there is not a direct connection between investment in buildings and scientific productivity or between the improvement of the infrastructure and scientific productivity"

What is not clear is the link between the priorities set for the investment allocated to the Institute and the improvement of the quality of the scientific output that would result. It was also not clear that the idea of improving the excellence of the Institute would be achieved by prioritising investment in buildings. For some of these reasons Felipe suggested that:

> "when we think about the future of this project, one of the things that we need to do is [...] to have a good monitoring and evaluation system. We have to define good indicators which can demonstrate how this project has influenced scientific output, because that is the goal, isn't it? I doubt

> if the activities of the project have led to this. Some activities certainly have, but the features of this project are weak. It is not possible to make changes in personnel policies, it is not possible to recruit or bring in new people, it is not possible to create new posts [...] but if you have new buildings and you don't have people 'thinking' in these buildings, I don't know how in the future this is going to generate research [...]. I know that there might be other parts of the project which certainly could help (to achieve its objective), but the fact that instead of prioritising posts, buildings were prioritised was, I think, a great strategic mistake"

Scientific Management

Questions about the performance of the Institute in relation to its scientific management were raised during the interviews. Some aspects of the scientific policies and management of the Institute were mentioned by international agency participants. Some pointed out that the development of their scientific knowledge is related to the form of the science which is developed in other parts of the world. As an example, Henrique says that:

> "the traditional behaviour of researchers, not only from INPA but from the whole country and the world ... especially those most specialised ... is to conduct research and generate more knowledge as their prime objective"

Thus, according to him, the research developed within the Institute would be following a sort of pattern with a set of rules generally accepted and implemented within the scientific community world-wide. In this case INPA in some sense follows this pattern in the performance of their scientific work. However Henrique continues, expressing some concerns about changes that may need to be made in this sort of system in terms of the utilisation of this knowledge:

> "the old system helped in the process. The researcher was evaluated by his production of scientific research ... and not by his actual usefulness to the community. His career would (be judged) by the number of papers a scientist produced: if there were 10 scientific publications a year, that person would be a great scientist, but nobody asked what use the research was to the community"

In addition, the resistance to making changes to this sort of pattern which institutions of this kind commonly follow, was stressed in the interview with Felipe:

> "there is a long debate, and I think that is interesting. Let's say people that are involved in more pure or less applied research have great resistance when more applied research is mentioned. They perceive this as heavy external interference and if one tries to push research in some direction which could be more applied and related to problems, they begin to defend the importance of the basic or pure research. However, as I see it [...] they should still keep doing it, but in a way that the research could be directed to support the strategic needs that the country has"

This seems to express the views that have been given by external agents about the Institute. The way that the organisation has been generating its scientific knowledge may no longer be accepted, considering emerging demands, a topic also analysed earlier in this chapter.

In relation to institutional performance, the evaluation of the research staff and their scientific management, a strong criticism was made by Flavio who said that:

> "when I arrived at INPA they really had a lot of difficulties, because financial resources were so scarce, but they had very good, excellent research groups. The principal thing which made and still characterises the Institute's strength is the enthusiasm of the researchers. Everyone who is working there is there because they like the Amazon and not for financial reasons. INPA is one of the worst paid institutions in Brazil and in addition living in Manaus is very difficult, so I think at least they have got good research done in the Institute, but the Institute was having serious financial difficulties, and in terms of management they really had problems. But apart from the financial problems ... at INPA what they lack is real scientific policies ... a real scientific management, which they never had ... thus I think the main problem at INPA is the absence of a clearly defined scientific policy"

It is also worth mentioning that some of the observations made by Flavio could be connected to ORSTOM's wish to have more scientific co-operation with the Institute. The co-operation between the two organisations (ORSTOM and INPA)

was under evaluation at the time of the interview. It is also interesting to note that as a result of the fact that the person had worked in the Institute some references were based on that experience and this close contact. These perceptions could be observed in some of the references to the difficulties which some local scientists had in working in the Institute. The respondent knew some of the causes of these problems and sometimes got involved in these issues.

As observed in the work of Weigel (1994), who developed a study of the Institute in relation to Science and Development, the organisational structure of the scientific model adopted in the Institute involves a set of scientific units. This seems to include many different aspects of the Amazon region, which appears to be structured to allow a satisfactory performance of scientific development and the achievement of the institution's objectives. However, Weigel presents his criticisms, arguing that in fact this may show only a superficial form of structure. As observed by Weigel, a deeper analysis and a closer examination of the characteristics of the institutional scientific structure reveals that the scientific activities are highly fragmented and research conducted by each of the units is unrelated. Research is generally restricted by the rigid framework of the departmental structure, with little or no interdisciplinary work and so no clear connection between research units can be perceived. It is a characteristic of a system in which the parts are not integrated. This system may produce dissociated scientific knowledge which may have only limited relevance and value.

In addition, Weigel argues that this lack of scientific integration could also be observed in the choice of geographical areas for the development of the research. Each research department defines its own research priorities and the geographical areas in which their research will be carried out. It can be seen that there is not no prioritisation, integration or definition of specific geographical areas to be studied within the Institute. As a reflection of the lack of these scientific interactions, their institutional scientific expeditions are generally carried out separately by individual research units.

The scientific activities of the Institute appear to have been developed without central strategic planning, and without the institutional prioritisation which would link all its research departments scientifically and geographically to the achievement

of institutional objectives. The lack of scientific policies, research priorities and the absence of well-grounded strategies for improving institutional performance may hinder the improvement of scientific quality.

However it is worth mentioning that there are several aspects which may be involved in the production of scientific knowledge, especially considering the Amazon region and its characteristics. As an example, knowledge to be generated according to local demands may be distinguished from the universal scientific knowledge which has been generated world-wide, in which the scientific community has been involved.

Other questions involved in the process of generating knowledge such as priorities, local demands, methodology, policies and people involved may also be considered in the definition of research priorities and activities in that context.

To help the Institute achieve its aims, one of the participants suggested that it should attract highly qualified scientists. These qualified people were to help bring more resources to the Institute, through well designed projects.

Furthermore, according to one participant, attracting these scientists could only be possible if they were to earn competitive salaries. That is because researching in the Amazon region is such a difficult task. These difficulties are due to its distance from bigger centres in Brazil and the rest of the world, the high cost of living, low investment in scientific research, and the huge amount of research that needs to be carried out. Hence good salaries would definitely be needed to attract good scientists.

However, the Institute is part of a unified national personnel system which does not allow much flexibility in the performance of the administrative duties of INPA, as changes in aspects of the personnel system such as policies for recruitment and payment of salaries within the civil service are very difficult to achieve. The fact that the Institute is part of this national personnel system was a often highly criticised by respondents. For example, it does not permit performance pay or selection of staff other than through a national selection procedure.

Yet, as a research institution, INPA has co-operated scientifically with international organisations or groups. Despite the fact that some of these experiences were not as

positive as others, some of the people from the international agencies contacted have argued that this kind of co-operation should happen more frequently and that the Institute should be even more open to this sort of collaboration.

While these systems of co-operation are sometimes seen as necessary, important and as a positive exchange, there are some criticisms and controversies about this co-operation within the Institute. The experience has certainly generated many conflicts. One of them is that the illusion of scientific co-operation, presented without apparent interest, results in a constant loss of the knowledge generated in the region, as the material obtained does not always stay in the region and the scientific results of a work in collaboration does not necessarily generate the expected results (Weigel, 1994).

These experiences have sometimes also resulted in greater institutional fragmentation, where the Institute has lost overall control of the international programmes when they are controlled independently by departments, individuals or groups in the external organisation.

On the other hand, scientific co-operation could also be seen as very attractive to many scientists. International groups involved in co-operation usually had better structures to develop their research and better funding arrangements and availability. Thus these programmes would appear as substantial sources of material and financial resources in face of the variable and unstable institutional funding coming mainly from the Brazilian government.

The question of the co-operation of international scientific organisations with the Institute has certainly been a complex situation to resolve. Many of the activities involved in these programmes seem to be carried out without much control by the administration of the Institute. Certainly, without knowledge and control of the programmes, it is difficult to organise and control the Institute's activities, define criteria and objectives for its development and to plan to improve the standard of at the Institute.

Recent evaluations of International Collaboration by other authors or experts

Some scientific works analysing specifically scientific collaboration, using the Institute as a case study, have been developed. These works include the article *International Scientific Collaboration in Brazil, the Case of the Amazonia National Institute* by Lea Velho. The author analyses the degree of scientific co-operation between Brazilian researchers working at the Institute and their colleagues from various advanced countries, performing a detailed analysis of the scientific outputs from such collaboration projects, and the circumstances under which the partnerships develop. The author concentrates especially on the analysis of the French co-operation at the Institute (Velho, 1995).

As mentioned earlier the agreements between the scientific institutions involved usually state that each party is responsible for half of the activities and financial input required in the project. In Brazil, however the governmental instability in providing the regular necessary funding for these projects makes the development of the activities of the Brazilian scientists involved extremely difficult. The author observes that the instability in the scientific financing by the Brazilian government and the bureaucracy involved in the disbursement of financial resources for the Brazilian side, meant that the granting of resources was often very irregular. In some cases the financial resources for the Brazilian part of the project were never ever allocated by the government. As such, the differences in the scientific production of the two groups of scientists involved in such collaborations are very substantial.

This irregularity in the availability of financial resources for the projects of the Institute frequently generated a great anxiety and frustration for the people involved. One example of these stressful situations, mentioned by participants, was the anxiety in waiting for the resources to be used in fieldwork activities, for instance. Some fieldwork in the biological areas can not be carried out at any time of the year, but needs to take into account the seasonal period for certain species. Without the necessary funding, the fieldwork needs to be delayed until the next season or needs to be completely rearranged.

The few groups in the Institute that have the better structure needed to develop their research, were generally linked to projects with international institutions. The

international institutions involved were in most cases also linked to traditional international research institutions such as the German Max Planck Institute or the British ODA, and involved in big projects. In this cases such organisations could certainly offer a better structure for the development of projects.

A more recent scientific work is the MSc. Dissertation entitled "*O Projeto Dinâmica Biológica de Fragmentos Florestais – PDBFF (INPA/SMITHSONIAN): uma Base Científica Norte-Americana na Amazônia Brasileira*" (Minimal Critical Size of Ecosystems Project – a North American Scientific Base in the Brazilian Amazon) by William Nazaré Guimarães Gama. His MSc was carried out in a university in the North West of Brazil, the Federal University of Para. The author investigates a North American project, which is being carried out in an area about 60km distant from Manaus, in collaboration with the Institute. This American project receives support mainly from North American organisations. Gama analyses issues related to the participation and training of Brazilian human resources, and the scientific outputs in relation to the project as well as the dispatch of scientific material to other Brazilian institutions and foreign countries (Gama, 1997). Gama identifies several flaws in this international scientific project, particularly in the differences in the number of publications between the Brazilian and the foreign group, in the lack of training of human resources in Brazil and especially in the lack of control and illegal dispatching of scientific material to more developed countries. Several examples of formalism can also be identified throughout Gama's work, although this concept is not explicitly used.

Another relevant study is the article *A Presença Francesa no Instituto Nacional de Pesquisas da Amazônia – INPA* (The French Presence at the National Institute for Amazon Research), by Fabiano Toni and Léa Velho. The article is an academic publication based on the MSc Dissertation "*Avaliação da Cooperação Científica International em Pesquisa Biológica na Amazônia: o Caso Brasil e França*" (The Evaluation of the International Scientific Collaboration in Biological Research in the Amazon: The Brazil and French Case), carried out by Fabiano Toni in a Brazilian university in the São Paulo state (University of Campinas). In this work the authors develop an interesting analysis of the French co-operation with the Institute (Toni & Velho, 1996). With more regular funding and without many problems in carrying out

their research projects, these international groups which work in collaboration with the Institute may generate more scientific results and publications than are produced by their Brazilian counterparts. This is a view supported by Velho (1995). This situation produced a great inequality in the outputs of the two groups.

This situation, among other factors, caused CNPq to suggest the evaluation of some of these projects, especially the one in co-operation with France. These deficiencies seem to show that there was a need to even out the differences and define more clearly the participation of the Institute in the collaboration. The number of scientists involved, their specialities and the degree of their participation in the projects, the kind of results expected and the feedback to INPA are important aspects to be considered for the development of these programmes. However, the evaluation and revision of these programmes still does not seem to have produced changes in the management of international co-operation.

One other difficulty of these collaborations (Val & Higuchi, 1994) lies in the identification of the relevant areas and issues to be studied. The projects are sometimes a result of the individual interests and knowledge of a researcher or group of researchers. Apart from the interests of individual scientists, the objectives of those projects may also reflect only the interests and priorities of outside institutions and not those of INPA, and may not consider the relevance of the research to the region or local demands. This situation may happen as a reflection of the fragility of the scientific management within the Institute and the lack of definition in their scientific policy.

It is usually the case that a particular scientist from the Institute is responsible for the management of a specific project run in co-operation with external organisations. Most of the activities related to the control and management of these projects, and decisions required are made by those 'project managers'. Those activities are sometimes developed without the close involvement of or without the control of the institutional management.

Despite the fact that the Institute has an organisational unit where information about co-operation could be centralised, this information is not organised or collected by any specific department. This means that the management and control of

collaborative activities within the Institute proves to be very difficult.

Conclusion

This chapter presented some aspects of the changing process going on at the Institute and also gave some information and perceptions of international organisations involved in this study. The consensus of their views is that, despite the investment that has been made in the Institute, it is not certain that excellence will be attained. They seemed highly critical of the organisation, its scientific management and its institutional policies. They provide further evidence for the need to define clear strategies for the generation of scientific knowledge as well as for better institutional performance.

The respondents suggested that new demands have emerged (economic, environment protection, sustainable development, biotechnology and so on) and the Institute should pay more attention to the external environment in which it is embedded and try to adapt to changes. They doubted that the improvement process at the Institute could help to alleviate many of these problems. While some structural problems may be less complicated to resolve at the Institute, and this may have been one of the reasons why they were chosen, there are other problems which they saw as more difficult to resolve. The way the Institute has been organised has not showed that it can perform well and generate the expected results. The rigid bureaucracy of the Brazilian government under which the organisation is managed was seen as one of the reasons why it could not have the necessary flexibility to make the changes that are needed. In relation to the scientific activities, for instance, it was observed by outside participants that sometimes the sole interest of each researcher in specific subjects is the determinant to the development of research regardless of the social or economic effects of their studies and its impact of the society. This attitude may be influenced by the fact that the performance of scientists is often evaluated by the number of scientific works published instead of his contribution to the society.

The respondents presented criticisms in relation to the lack of scientific policies, as well as an absence of strategies for improving institutional performance. These problems can become serious constraints preventing the improvement of the quality

of the scientific knowledge and activities developed at the Institute. This chapter has presented stronger criticisms in relation to the Institute from international organisations than the views expressed in Chapter 5.

Chapter 7 - Conclusion: Why the Excellence Project did not succeed

Introduction

This study has investigated factors affecting the implementation and the dynamics of an initiative to improve the performance of INPA - a Brazilian research institute based in the Amazon.

This chapter intends to present concluding data and discuss the results in the light of the improvement process at the Institute, looking for an accumulation of evidence which might help to explain the success or failure of the Excellence Improvement Process. It is organised into seven sections. It presents a synthesis of the issues outlined in each part of the thesis, provides additional data on scientific production of the Institute, indicators of the academic performance of postgraduate courses taught at INPA, dissemination issues, human resources aspects and financial resources, and gives an example of political influence on appointment of top managers in public organisations. It concludes by analysing the impact of the improvement project on the Institute.

Summary

Before going further I will briefly review, in this section, the structure and argument of the thesis so far. This will provide us with an overview of the progress that we have made before we evaluate the success or failure of the improvement process.

The second part of the introductory section gives a description of the research institute involved in this study. That section describes some of the historical and institutional characteristics of the Institute.

INPA is a scientific research Institute dealing mainly with biological research related to the Amazonian region. A movement to create an international organisation in the Amazon for the development of studies of the region lies behind the setting up of the Institute – and is described in Chapter 1.

The Institute is an agency of the Brazilian government directly linked to the Ministry of Science and Technology. Some of the peculiarities of the Brazilian administrative system are pointed out in that chapter as well as details of the organisational, scientific, and physical structure of the Institute. Some aspects of its human resources and scientific co-operation are also explored in that section.

Chapter 2 addresses quality and excellence issues. Quality management approaches have been widely used to improve the quality of products and services in organisations world-wide, and provide a theoretical background for this study.

Although a technology first used in the private sector, quality management approaches have also been applied to public institutions to improve the quality of its services. The chapter looks into issues relating to the conceptualisation of excellence, the use of the quality approach in the public sector and some of the implications of managerial issues in developing countries.

In order to understand the improvement process at the Institute, an outline of another relevant theoretical framework, *formalism*, which helps the analysis of the environment in which organisations are embedded in developing countries is also used.

Chapter 3 presents the methodological aspects of the research. The research approach used may be characterised as a case study of a scientific institute which also looks at the participation of international organisations connected to INPA. It is an exploratory study which takes the form of an *in depth* analysis of the organisation involved.

This study includes interviews with international agents, who are representatives of governmental organisations connected to the organisation, and also with key employees of the Institute. The first section of Chapter 3 describes the participants

and their educational and/or professional background. Most of the interviews were conducted in the Brazilian cities of Brasilia and Manaus.

We see in Chapter 4 the description of the process of improvement of the organisation. The improvement process is a sub-programme of the World Bank's Pilot Program to Conserve the Brazilian Rain Forest - PPG-7, known as the Science and Technology sub-programme. The first part of the chapter gives a description of the programme and background information in relation to the improvement process at the Institute.

The chapter also presents the organisational approach to the improvement process at the Institute as well as the main guideline documents for the project which aims to transform INPA into a Centre of Excellence.

Chapter 5 gives an overview of the results obtained during the data collection process, and at the same time, outlines and discusses structural, managerial and scientific issues at the Institute. I argue later in this chapter that these are important issues which strongly affect the implementation of the Excellence Programme at INPA.

The chapter on data analysis is mainly based on the interviews carried out with people from the governmental agencies contacted and people from the Institute. In the second section the particular characteristics of the management of the organisation and the managerial characteristics and style of recent directors of the Institute have been presented, along with views from participants on the managerial approach at the organisation.

In addition, aspects related to the excellence issue at the organisation, such as the evaluation of the institutional quality, and excellence conceptualisation, are also included there.

For the purpose of this research six international agencies were contacted. These organisations have connections with the Institute through the scientific research projects or the improvement programme. A description of the participants from these international agencies and the agencies involved in this study themselves is

presented in Chapter 6 as well as a description of the links those agencies have with the Institute.

International agents from these organisations provided evaluations and expressed concerns in relation to the Institute. The main issues raised were connected to the organisational structure of the research, management and publications, institutional performance, problems with personnel management, such as the low level of remuneration paid to scientists at the organisation, and the Institute's failure to meet the needs of its customers.

Evaluating the Success of the Improvement Process

As mentioned before, INPA has been involved in a process of improving the quality of its performance. It is important to bear in mind that the aim of the Science Centers project of the PPG-7 is to strengthen the scientific research institutions of the Amazon in order to promote the generation and dissemination of scientific knowledge in the Amazon region. Instead of analysing further the formal activities that make up the Excellence Project, I am going to develop an analysis of the improvement process looking at specific indicators which will provide information about the impact of the programme on the Institute and whether substantial improvement has been achieved. With this approach I hope to cover the activities which are proposed at the programme without discussing each of them individually.

The next sections of this chapter are going to evaluate aspects related to the effectiveness of the improvement process at the Institute. The analysis of outputs generated at the Institute will help us to reveal the impact that the improvement process has had at the organisation. Having analysed the success or failure of the improvement process we will then examine the reasons behind that success or failure. We shall look at the inputs into the Institute, and the impact that they have had on the improvement process.

We have chosen this approach as it assesses whether the aims of the Excellence Project have been met, rather than whether all the individual tasks set out in the MOD

document have been completed. This is because there is doubt as to whether completion of all those tasks would lead to the improvements required for the Institute to become a Centre of Excellence. Also, the aim of the improvement process is to make sure that INPA becomes a Centre of Excellence. It is only of secondary importance exactly how this is achieved. Our approach will evaluate firstly, whether Excellence has been achieved, and secondly, why the initiative has either succeeded or failed.

As such, we shall start by analysing indicators of the institution's scientific productivity, teaching performance and dissemination activities. We have chosen these particular indicators as they reflect the main activities of the Institute, and will tell us what progress has been made. They cover fully the aims of the Institute, which are to research the Amazon region and to pass on the knowledge that has been discovered to those who can use it most effectively.

Indicators of Scientific Production

One of the most important, if not the single most important outputs of a scientific institution is its scientific production. Improvement processes in scientific organisations should be concerned with the improvement of the knowledge generated in those organisations, as is the intention of the Excellence Project. This section analyses some indicators of the scientific productivity of the Institute.

As one of the starting points for the improvement process, the Institute developed an internal institutional analysis. One of the issues analysed was related to its scientific production. Although the description of the analysis referred to in this section is from the 1994 Strategic Plan Final Report (page 33), the data used in that report comes from the MCT report "*O INPA como Centro de Excelência de Pesquisas na Amazônia*" (1993). Looking at the constraints on its performance, the institutional analysis observes that in the 5 year period analysed, a total of 906 scientific works were produced. From those, 301 were in national journals, 258 in international journals, 86 chapters in books, 162 works published in annals of scientific conferences and 99 were theses. The report continues, explaining that:

> "... in general terms, a total of 2.3 works per PhD researchers a year is produced, considering the number of 777 published works which were registered and that have got at least one researcher of the Institute among the authors. This number changes to 1.7 scientific works a year if we consider the total number of MSc and PhD researchers. Considering all the scientists of the Institute, a number of 0.57 scientific work is published a year or approximately 1 every two year period, considering all kinds of publications. It should be noted that from the total of 273 researchers ... 46 have published just one scientific work as first author in the period of 5 years analysed. It can be observed that the scientific production is highly concentrated. If we consider the 3 most productive first authors of each department, we can observe that 13% of these scientists are responsible for 56% of the scientific work produced"

The institutional analysis developed by the Institute and summarised in the organisational report, Strategic Planning Final Report (1994), described in more detail in Chapter 4, argues that it has enormous potential to develop significant technological and scientific production, with high standards of quality. However, it has been performing much below its true potential (INPA, 1994).

On the basis of the assessment exercise and measurement of the institutional scientific production, the Institute states that although these numbers represent a significant scientific contribution, they recognise that those indicators of production could be higher. It is also important to point out that the self-analysis of the Institute states that it has a great chance to 'develop significant technological and scientific production'.

Thus, this data shows clearly the low quantity of scientific production of the Institute. However, it is not clearly specified which five years were actually analysed in the report. The report was compiled in January 1993, and therefore, the five year period to which the report was referring could be 1988-1992. However, the tables in which this information is displayed in the MCT Report specify the source as 'INPA, 92'. The INPA, 1992 reference can not be traced through the MCT Report, and therefore, could not be identified. From this evidence, the period referred to could be

1987-1991. In any case, the data presented shows levels of scientific productivity at the Institute before the implementation of the Excellence Project.

In addition, it is also interesting to observe that the data given contains some inconsistencies. The extract mentions the sentence 'total of 273 researchers'. This corresponds to 71 PhD's, 118 MSc's and 84 people with first degree, according to the MCT report. The number of publications mentioned in the first paragraph of this section is 906, whereas the extract from the INPA report says that 777 published works were registered. However, when we divide either the number of published works registered (777) or the number of scientific works produced (906) by the number of years (5), and the number of publications produced by scientists with PhDs (or those with PhDs or MScs together) each year, the results do not match with the data provided in the extract. The fact that the written institutional reports do not present clear information about the activities performed at the Institute, especially in relation to the number of researchers and their scientific production at the Institute, may be clearly characterised as another example of formalism at the institution.

The next table presents more updated indicators of the scientific productivity of the Institute, from 1995 to 1998, and compares them with the data indicated above.

Table 13 – Comparative Scientific Production of researchers at INPA.

TYPE OF PUBLICATION	**5 YEAR PERIOD**	**1995-1998** **(4 year period)**
Scientific Journals	559	427
Chapters (books)	86	119
Scientific works in conferences	162	108
Thesis	99	37
TOTAL	**906**	**691**

Source: INPA, 1994 and INPA, 1999.

Although, as observed earlier, the years related to the data presented in the second column are not clearly specified (5 Year Period), the comparative indicators of the scientific production in the periods presented show a decrease in the scientific productivity of the Institute.

The indicators presented in the third column represent the period of 1995 to 1998, where the implementation of the Excellence Project had already started, and reveals that the scientific production of the Institute has decreased if compared to the previous period. It is important to point out the awareness that the first column presents information about the scientific production over a five years period whereas the second one is only over a period of four years. The report observes that the implementation of the Excellence Programme, instead of improving the generation of knowledge at the organisation, has jeopardised the scientific productivity of the Institute. The report says (INPA, 1999:26):

> "in these four years, for essential operational needs, part of the most competent and productive researchers were so strongly committed to the activities related to the implementation of the institutional modernisation actions that the scientific production became seriously affected"

However, the Total Quality Management approach stresses that a great deal of participation and commitment are expected from people involved in quality improvement programmes. Staff responsible for the day-to-day running of the organisation are the ones most likely to know where the development of activities can be improved. In addition, without contracting new staff or hiring people to implement the changes proposed, it is necessary that the most qualified staff would be involved in the implementation of some activities of the project. It is, at best unclear that this involvement will ultimately lead to a long-term improvement in the scientific productivity of the Institute.

The 1999 institutional report observes that the improvements in the infrastructure, material and equipment are going to produce more positive effects in the short and long term and a significant improvement in the production in the future is expected. However, there is not sufficient evidence to conclude that these changes alone are likely to produce improvements in the quantity of the scientific productivity of the Institute or that there has been significant improvement yet. Reasons for that include that no new staff can be contracted, and new buildings have not been completed.

A lack of more systematic and organised data about the scientific production of the Institute prevent us from making a deeper analysis of the scientific productivity of INPA. There is no information which allows us to look at trends of scientific productivity between 1995, when the excellence project began and 1998. This is important information which could reveal the degree of success of the implementation of the Excellence Project in this aspect.

The data clearly shows that the Excellence Project has not yet had any impact in the scientific activities of the Institute. There is a possibility that the scientific production may increase after all phases of the project has been completed although that cannot be guaranteed, given that no evidence on results after 1998 is yet available at the Institute.

However, if we compare the situation we are now in, with the Institute's self analysis of an organisation with 'enormous potential to develop significant scientific production' observed at the Strategic Plan (INPA, 1994), a statement mentioned

earlier in this section, we can see that the Institute has not been able to develop this potential yet. Despite the overall aim of the Science Centers project 'to promote the generation and dissemination of scientific knowledge', it is important to point out here that targets were not specified in the programme for increasing the scientific production of the Institute. The conclusion cannot be avoided that the scientific production of the Institute has decreased over the years, despite the implementation of the Excellence Programme.

Teaching Performance

As part of an institutional programme for the dissemination of the scientific knowledge generated at INPA, the Institute is also responsible for the management of postgraduate courses. This section is concerned with presenting the academic performance of the Institute in relation to the postgraduate courses (PhD and MSc) taught at INPA. An important evaluation of the academic performance of the Institute is made by a Brazilian governmental agency named CAPES (*Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*), which is one of the governmental funding agencies for postgraduate education. This evaluation is made every two years. As such the academic performance of the postgraduate courses taught at the Institute is evaluated through that evaluation exercise.

CAPES is responsible for the evaluation and classification of postgraduate courses in Brazilian higher education institutions. The classification of the performance of the courses is according to indicators which range from A to E in a decreasing order. Thus, the courses classified as A are the ones with best performance. The courses classified with an E grade are the ones which do not have the minimal essential requirements to perform. This evaluation is based on information related to Lecturers, Curriculum Structure, Research Activities, Scientific, Technical and Artistic Production and Students as well as consultants' reports. A table showing the results of the evaluation of the performance of the postgraduate courses of INPA is given below:

Table 14 - Evaluation of Postgraduate courses of INPA by CAPES from 1995-1998.

COURSES	START YEAR	LEVEL	1995	1996	1997	1998
FISHING AND FRESH WATERS BIOLOGY	1976	MSc	B	B	B	B
	1984	PhD	C	B	B	B
BOTANY	1973	MSc	C	C	C	C
	1976	PhD	C	C	C	C
ECOLOGY	1976	MSc	A	A	A	A
	1976	PhD	C	A	A	A
ENTOMOLOGY	1976	MSc	A	A	A	A
	1976	PhD	C	A	A	A
TROPICAL FORESTS SCIENCES	1980	MSc	C	C	C	C

Source: INPA, 1999 and CAPES, 1996.

The table above presents the indicators of performance for the postgraduate courses at the Institute for the period of 1995 to 1998. Although no changes were noticed in the MSc in Fishing and Fresh Waters Biology, the PhD on that subject, which was given a C indicator in the evaluation of 1995, had been upgraded to a B indicator in 1998. Three courses have had a poor evaluative indicator, C, throughout this four years period while the PhDs in Ecology and in Entomology have been upgraded from a C indicator in 1995 to an A indicator since 1996.

An interesting piece of information is related to the dates these courses started. According to a CAPES report (CAPES, 1996), the most recent course has started more than sixteen years ago, in 1984.

This data shows that only the Ecology and the Entomology courses at INPA were classified in the A category on the CAPES evaluation. Many of the postgraduate courses at the Institute received an average classification for institutional postgraduate courses.

The grid shows that the overall performance of the courses has changed significantly, but not hugely. Although improving the academic course standards is not an explicit goal of the Excellence Project, it is implicit in the idea of improving the dissemination of information and research to the local population.

Though not figuring as a specific goal of the programme, there are some activities in the project, which are related to the graduate programme of the Institute, such as carrying out field researches and improving classroom conditions. However, there is not enough evidence yet that the development of such activities of the project has had much impact on the outputs of those academic courses. It can be said that, in this case, the Excellence Project has not had much impact on the performance of the academic activities of the Institute.

Dissemination

The lack of interaction of INPA with the users of its services, that is, with its customers, was diagnosed as a significant issue which has been neglected at the Institute. For that reason, one of the items included in the Excellence Project was a 'Dissemination Programme' which would be mainly concerned with the development of activities related to the dissemination of the scientific knowledge generated at the Institute.

Three activities were included in this component: dissemination of scientific information, an extension programme, and support for an in-house unit. The previous sections on scientific production and teaching performance have provided and analysed information related to the development of scientific and academic activities of the Institute, which is part of activities for dissemination of the scientific knowledge generated there. This section is going to provide more information related to the other two parts of this component of the Excellence Project.

In relation to the 'support for an in-house unit' at the Institute, a dissemination department was set up which would strengthen the interaction of INPA with its customers. As was hinted by the information provided by Gabriela in Chapter 5, the approach of customers to the Institute is made through that dissemination

department. However, in this contact with the Institute, users are often proactive, and there is not much evidence of the Institute making a more active attempt to interact with its customers.

The institutional reports stress that the updating of the Institute's own scientific magazine, which had not been produced since 1993, was one of the most significant activities of this component. The development of promotional information through books, leaflets and folders is also suggested, although these are clearly more directed to the scientific community, whereas more accessible material to the non scientific community does not seem to be developed at the same rate.

In addition, the dissemination department consisted of only 4-5 employees. In relation to the publishing of scientific material, it is interesting to point out that the dissemination department is not responsible for composing the material for publication. This is the responsibility of the specific department to which the scientific material that is to be published relates to. Instead the dissemination department is only responsible for the organisation of the material before it is sent for printing. In such a situation, there is no guarantee that the kind of language used by a scientist is going to be accessible for the non-scientific public.

As observed in Chapter 5, although a significant initiative was taken in the setting up of such a department, this does not seem to prove to be enough for narrowing the gap between the Institute, and the local community and its customers. The section for scientific production did not show much improvement in the dissemination of scientific knowledge at the Institute. This section has also pointed out that dissemination activities which define more clearly institutional strategies and actions to identify where customers are, and which information would be useful and accessible for them, should be developed.

Constraining Aspects which Interfere with a Successful Implementation of the Improvement Process

We have examined in the earlier section some performance indicators of the Institute. We tried to relate the information presented to the process of improvement

of the quality of the organisation in order to analyse the extent of the impact of the improvement programme at the Institute. The indicators show us that although some improvement could be observed it was not as significant as would be expected. The next sections are going to present and analyse some of the institutional aspects that might interfere with the implementation of the Excellence Project. Those are mainly related to human resources, political interference and scientific management, and have been selected either because they were raised by interviewees as potential difficulties, or as a result of my observations while I was at the institute in my fieldwork.

Human Resources Aspects

Many works studying quality and quality initiatives stress the importance of human resources in quality improvement programmes. Swiss (1992) for instance has told us that 'people are the organisation's greatest and most unique resource'. The next sections are going to analyse some aspects related to human resources management at the Institute such as the number of employees, salaries paid to the Institute's staff, and training.

Number of Employees

This section is going to provide and analyse information on the number of employees at INPA since 1990.

Table 15 – Evolution of employees at INPA from 1990 to 1996.

	1990	1991	1992	1993	1994	1995	1996
EMPLOYEES	990	935	911	930	876	822	791

Source: INPA, 1997b.

Table 16 – Evolution of employees at INPA from 1994 to 1998.

	1994	1995	1996	1997	1998
EMPLOYEES	930	822	774	744	721

Source: INPA, 1999.

Data displayed in Tables 15 and 16 present information on the number of employees of the Institute but they come from two different institutional reports. One of the points I wish to make in presenting both tables is the lack of consistency in the data they present. While the number of employees in 1994 in Table 15 is 876, on Table 16 the number of employees of the same year (1994) is 930. Even after trying to find out why there is such a difference, it was impossible to find out a logical explanation. The same variation can also be found in the data relating to the number of employees for the year 1996.

Even with the mismatches in the data, the information displayed on Tables 15 and 16 shows that the total number of employees of the Institute has decreased by around 200 since the peak in 1993-1994.

When we look at the number of scientists at the Institute, which was discussed in an extract in the Indicators of Scientific Production section presented above, which is based on the MCT report, we find that, from 273 employees in the early 1990's, the number has dropped to 227 in 1998. A reduction of 46 scientists in a research institute with the characteristics of INPA represents a significant problem for the development of scientific activities.

In relation to the number of employees at the Institute a number of views regarding this question were expressed by different groups, for instance:

> "in fact, we keep losing people to private enterprises, in other regions of the country ... we have to deal urgently and radically with this problem of contracting new human resources" (Antonio, Senior Researcher, working in a Research Department)
>
> "the most famous scientists ... are all gone ... a lot of them are gone and new ones were not recruited" (Flavio, ORSTOM, Senior Researcher)
>
> "[INPA] has lost a lot of staff in recent years" (Rogerio, Governmental Officer, Senior Researcher)
>
> "exodus of the most qualified staff" (Scientific International Advisory Group)

This data has demonstrated that the reduction in the number of employees and the problems in contracting new staff at the organisation has been a significant issue expressed by people inside as well as outside the Institute. However, although it was not an issue raised as often as the reduction in the numbers of employees, a number of respondents have also pointed out constraints on dismissing staff and raised the question of the quality of the staff:

> "the problem is the difficulty in recruiting and dismissing people" (Felipe, World Bank, Senior Researcher)

> "only 10 to 15 researchers operate at an international level and only 30 to 35 could be considered good" (Tundisi, Institutional external evaluation, Senior Researcher)

> "more than 700 [people] of whom only 300 produce" (Carlos, Senior Researcher working in a Administrative department)

The extracts above seem to suggest that an important issue faced by the Institute, and also expressed during interviews, is the quality of its staff. Table 17, presents some information on the educational background of employees of INPA:

Table 17 – Educational qualification of the staff of the Institute in 1996.

EDUCATIONAL BACKGROUND	QUANTITY
Primary School (incomplete)	198
Primary School (complete)	46
Secondary School (incomplete)	19
Secondary School (complete)	270
First Degree	65
Master's Degree	105
PhD	99
TOTAL	802

Source: INPA, 1997b.

The report where the data contained at the table is presented observes that from the 882 people, 238 employees make up the research team. From those, 204 had a masters or doctoral degree, 33 had a first degree, and 1 is qualified through experience. This brings us to a total of 238 people from the research group.

The number of employees working in the management and administrative areas in the Institute is 564, of which only 32 employees have got a first degree. Although the table shows 65 employees holding a first degree, 33 of these employees with first degree work at research departments, according to Table 18. The number of employees with a first degree working in the administrative area represents only 4% of the total number of members of staff.

Table 17 also reveals some information which should be a major cause for concern. According to the institutional report (INPA 1997b), the number of staff who have got only incomplete primary school level education is 198 people, which represents 25% of the total number of employees. Additionally, 289 people have either been educated to a complete or incomplete secondary school level.

Given the peculiarities, complexities and hugeness of the region in which the Institute is located, and the need for the generation of knowledge, it can be said that the number of scientists is relatively low. In addition, it is worrying that a high percentage of employees of INPA have such a low level of education. Most of those employees are located in the administrative area of the Institute.

However, as a research institution, INPA has a number of employees who have higher academic qualifications. In the next table, the evolution of the qualified scientists, during a period ranging from 1994 to 1998 at the Institute, is going to be presented.

Table 18 – Higher educational qualification of scientists at the Institute from 1994 to 1998.

ACADEMIC QUALIFICATION	1994	1996	1998
PhD	71	99	102
MSc	123	105	103
First Degree	53	33	22
No qualification	1	1	-
TOTAL	248	238	227

Sources: INPA, 1997b and INPA, 1999.

The 1999 institutional report observes that 14 out of the 227 scientists with higher education in 1998 were not involved in research activities. Thus, the great majority of people with higher education were working in the research area. It could be concluded from Table 17 that the great majority of people with a lower level of education work in the administrative area or in support of scientific activities. Among the list of people who work in the scientific activities support services there are 11 fisherman, 33 night watchmen, 26 drivers, 37 rural support staff, and 48 technical support staff.

As can be observed, there are significant differences in the level of qualification of the staff of the Institute. Some of the difficulties that come from the differences in the level of specialisation of the people working in administrative and research activities have already been discussed earlier in the thesis. The conflicts between the Administrative and Research areas were pointed out in Chapter 5 by people at the Institute, for instance. People from international agencies also stressed the question of the capability of administrative staff in using the resources efficiently. The level of qualification required for scientists is certainly higher than that for people who work in the administrative area. These differences, however, may contribute to a limitation of the institution's capability to deal with internal as well as external demands including dealing with financial resources. This concern about the shortage of qualified people working in the administrative area was a theme discussed in Chapter 6 in the International Agents Concerns section.

However these concerns do also seem to be an important issue discussed internally within the organisation. An analysis of this situation is given in the Final Report of the Strategic Plan (INPA, 1994:48) of the Institute:

> "an essential element which appears to constrain the research development is the administrative performance. An evaluation shows clearly the need to improve the performance for planning and the improvement of the whole administrative support for the research. In this direction, it is suggested that there should be a project designed to improve for administrative strength, for more agility, flexibility, and efficiency in the management of human, material and financial resources available to INPA. The training for the administrative area, expansion of the computing facilities, the creation of a new foundation and an institutional reorganisation are essential aspects in this direction"

Institutional administrative services and functions performed by those clerical staff should clearly support scientific development, which is the main purpose of the Institute. People from the administrative area should have the necessary training and capabilities to perform tasks according to the demands of the Institute. In this sense an adequate human resources development programme could be a way to improve their capabilities.

In recent years the number of people who have left the organisation has increased considerably. One factor which might have contributed to the decrease in the number of administrative staff in the Institute was the setting up of a governmental programme called PDV - Voluntary Dismissal Programme (*Programa de Demissão Voluntária*) to encourage civil servants to leave their jobs. As a result of this programme some employees had recently left the organisation. The proposal to extend this programme to scientists, which was initially designed to also allow them to make use of these incentives for redundancy, was stopped by the government. It seems that, in their opinion, even more researchers would have left the public sector in search for better work conditions in private enterprises.

The restrictions of the Brazilian bureaucracy on admission of staff as well as on the dismissal of staff does not give the Institute the necessary mechanisms to manage its human resources efficiently. This means that the Institute has had difficulty in retaining high quality staff, even if it has managed to employ them in the first place. In addition, the Excellence Project has not been able to make the needed changes in this area which would give the Institute the flexibility required for more efficient human resources management.

Salaries

The administration of salaries is another important aspect in relation to the management of the human resources of an organisation. A strong theme regarding this subject expressed by respondents was related to the problem of the low salaries paid to the people working at the organisation. In addition to the comments of the employees, views regarding the salaries paid at the Institute were also expressed by Governmental officials, the Scientific International Advisory Group, by Tundisi, who developed an external evaluation of the Institute and also by international agencies. A strong statement is made by Flavio, from ORSTOM, who observes that:

> "INPA is one of the worst paid institutions in Brazil"

Thus, this section is going to analyse this important issue which was a theme often discussed in the interviews. The next table will present the evolution of the salaries of the Institute's employees over a period of almost a decade.

Table 19 – Salaries of the Institute from 1990 to 1998 (in US$)

SALARIES	1990	1991	1992	1993	1994	1995	1996	1997	1998
Top Level	2,612.39	1,324.08	935.79	1,267.42	1,140.64	1,488.55	1,354.65	1,187.35	1,138.80
Intermediate Level	1,077.60	605.46	421.09	725.30	673.16	879.94	800.77	746.21	734.16

Source: INPA, 1999.

The data shown in the table above, which is presented in US$, correspond to the average monthly salary paid to INPA's staff in that specific year. The data is based on the highest salary paid to employees in each of the two specified categories. The figure presented for the year of 1998, however, relates only to the average salary paid to the Institute's employees up to October of that year and as such does not cover the whole of 1998.

The first row of the table specifies the year to which the salary corresponds. The second and third rows correspond to the salaries paid to employees at the top level as well as at the intermediate level of their career at the Institute. At this point it is important to mention that the basic distinction between those employees who are at the top level and those who are at the intermediate level is their level of education. People at the top level have got a first or higher degree whereas people classified at the intermediate level do not hold a first degree.

It can be observed that the data displayed in table 19 shows a great variation in the salaries of the Institute's staff along the years. The data shows that during the period of 1990 to 1992, the salaries paid to people at the top level decreased very considerably, from US$ 2,612.39 to US$ 935.79, which comes to a decrease of 179%. The people placed at the intermediate level also had a considerable decrease, of 155%, in their salaries at the same period. Despite the fact that the salaries had risen slightly from 1992 to 1993, in 1994 there was again a drop in the level of salaries paid to INPA's employees in both specified categories.

It could be observed from the table above, that although the salaries had risen again in 1995, they have decreased in all of the subsequent years. The level of salaries paid in 1998 represent less than half of that paid in 1990, and the remuneration of the Institute's staff throughout the years specified has never achieved the same level as that paid in 1990. Despite the investment in the Excellence Programme, its implementation does not seem to have had any effect on the salaries of INPA's employees.

However, although the figures are displayed using the American Dollar as a reference, staff are paid in Brazilian currency. For a better visualisation of the

difference between the Brazilian currency (*Reais*) and the American Dollar, a table is presented in Appendix 3 with the exchange rates from 1990 to 1998. Looking at the exchange rate table, it can be seen that the salaries have also decreased in the local currency. It is important to stress that, up to 1994, the country was experiencing high levels of inflation. Accordingly, with the decrease in the salaries paid to the Institute's researchers, their purchasing power would also decrease considerably. Thus we can conclude that the salaries of the staff of the Institute has declined both in Brazilian currency terms and, more sharply, in real terms.

The current institutional human resources policies are devised by Brazilian central government, and do not give the institution much flexibility in the management of its human resources and especially in the management of their pay scale. The salaries of the staff, for instance, are fixed by the central government and no changes can be made unless authorised by them. It is important to stress that salaries also vary between different Ministries, and there are cases where scientists or administrative people working for different agencies of the Government receive different rates of salaries, such as in the case of EMBRAPA, mentioned in the Institutional Evaluation Section at Chapter 6. The salaries paid to the Institute's staff are usually lower than those paid for researchers working at EMBRAPA, the local university and other institutions located in other parts of the country, supported by different ministries.

In addition, changes in the salaries are usually only made in the rare occasions when there are rises in the salaries of the whole of the Brazilian civil service. As a government policy to reduce expenditure on personnel, the civil service has not had any rise in salaries for six years. It can be observed that this strongly hinders organisational performance. With such low salaries, there is an institutional inability to retain qualified staff and to attract good and young scientists. The low salaries and the lack of incentives as a reward for scientific productivity are some of the problems which strongly affect the Institute's capacity to manage its human resources satisfactorily, and it does not appear that this situation can be changed in the short term at the organisation.

The low salaries paid to the Institute's employees may in part explain the reduction in the number of qualified staff of the Institute. With low salaries and no increase for several years, it means that over the years the scientists have had a very substantial drop in their remuneration. This situation would certainly not be attractive to new scientists and at the same time would not prevent good scientists leaving the institution for better work opportunities. This is likely to prove a great difficulty in improving the quality of the Institute's work.

Training

An important aspect related to the management of human resources at the Institute involved the development of human resources. One of the activities included in the Excellence Project involves the improvement of the human resources capacity at the Institute. This part of the project gives a strong emphasis on scientific training. The main goal of the management of Dr. Menezes, as observed in Chapter 5, was also in the development of the scientific community of the Institute.

A series of activities comprising a programme called the Human Resources Development Programme of INPA (*Programa de Capacitação do INPA*), which is designed to improve scientific training and exchange, have taken place at the organisation. The total amount of investment in that programme in 1996 was R$ 8.917.857,00. There are different sources for funding of this programme at the Institute and other governmental organisations are also involved as funding agencies for such a programme. Accordingly, it is important to point out that less than half of that investment in such a programme is made from the Institute's budget, although it is not exactly clear what activities are undertaken as a result of this investment.

An investment from Phase I of the Excellence Project is directed to the improvement of the human resources capacity of the Institute, and we can observe from Table 4 in Chapter 4, the sum spent is R$ 528.000,00. However, it is not clear exactly how much of that investment from the Excellence Project in this area is made in any specified year in the programme. A rather strange point to note is that there is no mention that any of the investment in this programme comes from the PPG-7 funding (INPA, 1999). It could be said that the PPG-7 was either completely ignored

or the investment in human resources capacity of the Institute was not used in that year.

In addition, although the dissemination of the knowledge generated at the Institute, through training and the experience gained from other scientists through exchange programmes is important, a significant part of the Institute's budget for this programme involves participants outside the organisation, and, as such, is spent on people who are not part of the staff of the Institute.

Another point which is important to make relates to the data presented earlier, in Table 17, which shows a general low level of qualification in the administrative staff. Based on the information provided above, and additional information about the qualifications of staff, these differences in the level of qualification between administrative and research staff may be due to a contrasting institutional human resources development policy. In this case INPA's administrative staff have not been receiving training to the same extent as research staff.

This concern about the shortage of qualified people working in the administrative area was a theme often mentioned as a strong deficiency of the Institute during the interviews. This issue was also mentioned in institutional documents such as the Strategic Plan Final Report, as discussed in Chapter 4 which observes that 'an essential element which appears to constrain the research development is the administrative performance'. An illustration was given by João, a junior researcher in Chapter 5, when talking about the communication between the scientific and the administrative staff he explains that:

> "there is a serious problem in the communication ... the researcher is usually concerned about developing science and usually doesn't know the constraints imposed by the structure of the Brazilian civil service, which the administrative staff have to deal with, and that has generated conflicts and there is a general consensus about that ... I think the Institute has got in the administrative area a quite strong deficiency, the number of administrative staff is reduced, and they have organised themselves in groups which develop their work in a inaccurate, slow and

> confused way, and they can't efficiently help the researchers in their work ... the problems generated by this situation are very stressful and we don't know exactly where there is the deficiency, it might be a deficiency in their qualification, or it may be a problem of groups who protect themselves because of the 'workplace collectivism', I don't know"

In addition, the link between the qualifications of people working at the Institute and the concern that the financial resources available for the Excellence Project would be used efficiently was an issue clearly mentioned in Chapter 6, Henrique from ODA, explains:

> "I also think that the capacity of the Institute in applying the financial resources efficiently is limited and that makes it complicated ... It is difficult to use this amount in a reasonable time, because there are not enough people in the administrative area".

As we have seen, there is considerable concern both among researchers at INPA and staff from overseas agencies about the competence of the administrative operations at INPA. However, there is no evidence that concrete steps have been taken to address this situation, and most of the efforts in training have concentrated on the scientific staff.

This section has discussed important aspects in relation to the management of the human resources at the Institute. The intrinsic bureaucracy of the Brazilian civil service in the area of human resource management has been a significant constricting factor for the efficient management of staff at INPA.

Budget

This section brings together data in relation to the financial resources available for the Institute in the 1990's. Table 20 and 21 show that the budget of the Institute has been growing steadily over the years since 1992.

Table 20 – Evolution of budget of INPA from 1990 to 1996.

	1990	1991	1992	1993	1994	1995	1996
BUDGET	4.767	3.158	2.586	3.605	4.251	7.132	9.255

Source: INPA, 1997b.

Table 21 – Evolution of budget of INPA from 1994 to 1998 (in US$).

	1994	1995	1996	1997	1998
BUDGET	4,251	5,940	8,512	7,993	8,962
PPG-7	-	-	2,997	1,507	1,580

Source: INPA, 1999.

On one hand the currency presented in Table 21 is American Dollars. On the other hand, Table 20 presents data up to 1996, but does not specify anywhere in which currency the financial resources are given. Another table is presented on page 12 of the 1999 report with data related to the institutional budget, which specifies clearly that the values are in Reais, which has been the currency in the country since 1994.

Table 22 – Institutional budget of the Institute from 1994 to 1998.

YEAR	BUDGET (in Reaisx1.000)
1994	4.252
1995	5.940
1996	8.512
1997	8.792
1998	10.754

Source: INPA, 1999.

However, as can be seen in Table 22, this data is not similar to the information presented in Table 20 above and therefore we can conclude that figures on Table 20 are not presented in *Reais*. It can also be noted that the data presented in Table 22, from 1994 to 1996 is the same as the data presented in Table 21. This is strange given that, as can be observed in the Exchange Rate Table in Appendix 3, the

exchange rate for the Dollar against the Real was not the same throughout that period.

The 1997 institutional report observes that the resources for the salaries of employees are not included in the budget specified in Table 20, and no information is given in the 1999 report about what is included in the budget presented in Table 21 and in Table 22. It may be related to research funding, training, acquisition of materials and so forth. Nevertheless, this information does not seem to explain the differences in values, given that the financial resources displayed in Table 20 are higher than those in Table 22.

Despite the inconsistency of the data presented in such reports, it could be observed that according to Table 20, from 1990 to 1992 the budget of the Institute suffered a decrease of around 84%. This shows that 1992 was the year in which the Institute had the smallest budget.

Table 21 show us that the financial resources available to the institution, have grown significantly since 1994, (with the exception of the year 1997) increasing by 110% up to 1998. However, according to the data presented in Table 20, the financial resources available to the Institute have been growing steadily over the years with an increase since 1992 of around 257%. Although data shows an increase in the budget it can not be assumed that this increase in the availability of resources for the Institute is going to continue in the years ahead.

Data presented in Table 20 gives us a picture of the irregularity of the financial resources provided to the Institute. With their dependence on central governmental funds, the organisation is subjected to a constantly irregular flow of resources. The difficulties which might come about as a result of this irregularity of resources were expressed during the interviews, as pointed out by Fabricio, a Junior Researcher of the Institute, in Chapter 5 when he explains about the planning for the development of fieldwork.

We can then say that despite the increase in the budget available to the Institute, there has still been a significant reduction in the number of employees of the

Institute. Data presented in Table 19 also show that the salaries paid to the employees have decreased considerably since 1990. Even the implementation of the Excellence Project, which caused an increase in the resources available to the Institute since 1996, has not been able to make any change in the pay scale of the Institute's staff and consequently, has not been able to reverse the critical situation of the loss of qualified employees at the Institute.

It seems that new sources of finance would probably help the organisation to have a more regular flow of resources that would facilitate, if well managed, the planning and execution of their scientific activities. It would be desirable if the organisation could lessen its dependence on public funding and increase its autonomy to allow for a more flexible management of resources.

Political Interference in Appointment of Directors

Public organisations may be influenced by political affairs depending on different aspects such as size, location, kinds of services delivered, financial resources generated and outputs produced. This section analyses the influence of political affairs in the organisation, especially regarding the appointment of top managers for governmental posts, and gives information on the appointment process for new directors at the Institute. As explained in Chapter 5, the process to choose a person to be appointed to the post of the director of the Institute, after the completion of the term of a previous director is usually done through an election process. Thus, as the term of the former director was close to an end in 1999, a process of internal election in the Institute was carried out, involving people from the research and administrative areas of the organisation, to select candidates for the post of director of the Institute. As usual, the election process produced a list of 3 names, in order of preference, which was then sent to Brasilia. The person on that list with most votes was a local scientist who has occupied top managerial posts in Manaus, including that of director of the local university. However political issues were then raised at that time, and it was shown that local politicians were exerting very significant influence in the appointment of a new director for the Institute (SBPC, 1999). This generated a great debate in the local and national media.

Chambouleyron (1999) observes that the commitment to those in power counts more than professional expertise when it comes to appointment to top positions in public organisations. An example of this may be seen as follows. The fact that the winner of the election for director of the Institute belonged to a political party in opposition to the one in the power was the single most important influence in the decision to not appoint him. Given the influence of local politicians who did not agree with his selection, the Central Government, through the Ministry of Science and Technology, then suggested that a different process should take place for the nomination of the new management and for that purpose a new and open national selection was initiated.

In that second election some renowned scientists were part of the group who would be involved in the process of selection of the best candidates for the direction of the Institute. The process of indication of the names for the Ministry consisted of the analysis of the candidates' *Curriculum Vitae,* their management programme for the Institute and interviews with them. In that second selection process the same person selected in the previous election was also the most qualified candidate chosen by the committee, who sent a report of the second process indicating 3 names to Brasilia.

The fact that the most qualified candidate, who had also gained the most votes in the first election, was still not appointed to the post produced a new series of debates in the media. Finally, after long debate, in November 1999, a renowned scientist, Dr. Warwick Estevam Kerr, who directed the Institute in the 70's was nominated as the new director of the Institute.

Dr. Kerr was not among the three people selected during the election process to be the director of the Institute. In fact he was one of the members of the committee who were recruiting candidates in the second selection.

It is interesting to note that the first election, which was made internally at the organisation, had given most votes to the same person appointed by the committee responsible for the selection of the candidates on the second round. This conflict demonstrates the lack of power of a scientific group in the political arena.

In a recent interview (SBPC, 1999) Dr. Kerr comments that unlike the 70's, the Institute now has a bigger and better group of researchers. He observes that one of the goals of his management would be to find out, through the scientific community of the Institute, about the most urgent needs for the organisation - the problems of salaries being one of the most important. He believes that:

> "if there isn't a reasonably fast solution to this question the loss of qualified human resources at INPA will be huge"

He felt that the Institute had grown since his last term of office and the staff has gained more qualifications, but it still suffers from administrative problems that undermine its performance, and need to be dealt with.

This conflict over the election process shows the political, scientific and administrative tensions which may occur in the appointment of people to top management posts in public organisations in some developing countries. The interest in the political affiliation of a person chosen to direct a scientific institution shows the great influence of politicians in the appointment and management of public scientific institutions. Riggs (1964) observed that prismatic societies often display the phenomenon of what he defines as 'overlapping', that is, where specific structures rarely function autonomously and there is a great influence of other related structures in particular administrative structures. A clear example of this in Brazilian public administration is the influence in the activities of some particular structures, in this case the scientific structure of the Institute, by other related structures, a Brazilian political party.

Appointments of top administrators for scientific institutions should not be influenced by the affiliation of the candidates to specific political parties. Although this appointment may be presented as a reasonable solution to the conflict, it did not respect the democratic process.

The post of director of the Institute is for a fixed four year period. As far as I am aware, no director has ever been removed from the post before the end of that term. On the other hand, it is relevant to mention that, a four years period might not be

long enough to implement and carry out scientific and managerially sound strategies for the improvement of an organisation. It is very rare for a director to serve more than one term at a time.

This means we have a situation where an effective director is limited to one four year term, and where there is no simple way of removing an ineffective director before his four years finish. This is clearly less than ideal for the effective management of the Institute. It leads to a lack of continuity in the running of the Institute, with each new director trying to please those who supported him, establish his own initiatives, and not necessarily continuing the policies of his predecessor.

A consultation of peers seems a reasonable approach to the appointment of top managers of scientific institutions, and seems more rational than a political choice. However, whilst there can be a place for Governments to influence scientific institutions in areas such as priorities, there is no justification for a Government to interfere in the day-to-day running of a scientific institution for purely partisan political reasons. The same kind of interference in scientific institutions in western societies would certainly seem very unusual and would probably provoke much stronger reactions in some segments of society. Scientific organisations should be concerned with carrying out scientific investigation and developing trustworthy scientific knowledge detached as much as is possible from political interference.

Accordingly, the administration of the Institute should be detached from the party political arena. This situation at the Institute shows that political reasons often have more influence on the appointment of top managers in governmental scientific organisations than scientific competence.

It is important to point out that, despite all the ideology of improvement of the institution and the international scientific rhetoric, there is still a great deal of political influence involved in the appointment of the director of the Institute. It is an example of blatant political interference in the operation of the Institute, and not based on any perceived problem at INPA. It is another example of Government action, like that preventing the Institute from having autonomy or controlling the level of salaries, which obstructs progress towards excellence. The improvement

programme did not seem also to be of any weight in this appointment and in the further discussions that were generated.

Concluding Remarks

Public research institutions seem to have been seeking organisational models which can give them the essential mechanisms to make them able to compete in an ever changing environment. This demands a strong self-capacity of organisations to search for new means to get more funding and to have more agility and flexibility to attend to the demands placed upon them.

A lot of criticisms about the Institute were made both by internal and external participants. There were doubts that the improvement process ongoing in the Institute could help to alleviate some of these problems. One of the lines of criticism made by respondents from international agencies, from Government and also from the Institute itself was related to the scientific management of the Institute, including the wide range of activities performed by the Institute.

According to critics there is a lack of scientific organisation at the Institute, which prevents the development of effective scientific activities, with a great number of research lines and activities, without much connection and integration, producing very fragmented work.

This picture shows that the scientific activities of the organisation seem to be developed without central strategic planning or institutional scientific prioritisation which would integrate the research departments scientifically and geographically to achieve institutional objectives. This is a view supported by Weigel, 1994. There was an attempt by the Institute to make significant changes in the way their scientific management was organised. However, according to data presented, it seems that this did not have much impact on the scientific organisation and it did not make the desired changes in that specific area. Even the design of a new organisational chart, as mentioned in Chapter 1, was not fully implemented as the original organisational chart of the Institute is the predominant structure of INPA nowadays.

The important strategic choices of priority areas do not seem to have yet taken place at the organisation. There is no clear evidence that they have been carrying out any evaluation to define such strategies, such as the analysis of important areas and definition of strategies of INPA, to strengthen areas of knowledge where the Institute has good performance, and eliminate those where the performance is low.

The lack of scientific policies, research priorities and the absence of well-grounded strategies for institutional performance strongly impede the improvement of scientific quality. Accordingly, it is likely that more radical changes in the way scientific activities are developed at the organisation could help the organisation to improve its performance. The introduction of more clearly defined scientific policies which could generate a greater integration between research units and scientists, may help the organisation to enhance its scientific performance, given the currently unconnected nature of much of the research carried out.

Some works studying quality management approaches observe that the quality of the provision of a service is closely connected to the satisfaction of customers. Accordingly, another methodology for the assessment of the quality of the scientific work of a given organisation may be through the evaluation of the quality of the work by the people who use that service, that is by its customers. In the case of the Institute the international agencies contacted may be seen as some of their customers. It was observed in the Chapter 6 that international participants have presented strong criticisms in relation to the quality of the scientific production of the Institute.

There is a lack of awareness of the ever-changing scientific and technological environment. The lack of connection between the Institute and other sectors of the society was also pointed out in this study. It might be useful to the organisation to strengthen the connection with society, integrating the establishment of their research priorities to the social and scientific demands of society, while introducing new mechanisms for a efficient scientific management.

A more effective customer care approach might help the Institute to interact more closely with the users of its service. This could help them to define more customer

orientated outputs, and also make the institution participate more actively in the definition of policies connected to the environment and to sustainable development of the region. These strategies might also give the institution a greater opportunity to establish different sources of funding for the development of scientific knowledge in the region. The alternative sources of financing, along with changes in the administrative and scientific management, might improve its degree of institutional autonomy and flexibility, increasing their chance to compete with stronger scientific institutions for more funding for their scientific development.

We recognise that these changes involve broader political issues. For instance, scientific and technology policies in Brazil have not been able to create efficient mechanisms which strengthen the scientific institutions located in the North of the country, which has significantly less investment than those scientific institutions located in the South of Brazil. Significant changes in the Brazilian scientific and technology policies, which consider the scientific structural inequalities of the different regions, would be likely to produce some correspondent effects in the scientific production and structure of the institutions located in the less developed regions of the country.

This study has also shown deficiencies in the management of human resources at the organisation. The low salaries paid for scientists at the organisation seem to be another significant issue at the Institute. For that reason, it is suggested that the organisation has not been able to retain qualified science and technology staff at the Institute because they have the chance of getting better salaries in other institutions.

Data has shown (especially those related to salaries, budget and the turnover of employees) that the Excellence Programme has not had much impact on the effectiveness of human resources management at the Institute. The last section of the Report of Institute produced in January 1999 (INPA, 1999) presents some concluding remarks, especially related to salaries and personnel, observing that it is there where they face great obstacles. The report says:

> "the data related to the number of employees of INPA did not follow in at same pace the investment for the modernisation of the Institute, and in

> fact it became a great obstacle for the development of the activities required by the Strategic Plan and PPG-7 and the new actions incorporated to the new institutional path"

The report follows observing that:

> "a serious problem in achieving the level of Scientific Excellence aimed for is also associated with salaries"

The report finishes concluding that:

> "without the replacement of qualified people, the investments tend towards uselessness, for an absolute lack of competence to accomplish the needed and fundamental work that could be expected of an Research Institution which has been the main focus of world attention"

The implementation of the project has certainly had a lot of problems. The above extract shows us important evidence that the Institute itself has formally recognised its lack of competence to successfully implement the project. The way the Institute has been organised has not shown that it can perform well and generate the expected results. The strict rules of the Brazilian government civil service under which the organisation is managed are one of the reasons they did not have the necessary flexibility to make the needed changes in the management of human resources, especially in relation to retaining qualified staff, defining new forms of incentives for performance of staff, and increasing remuneration.

In addition, the lack of competence of the institute to accomplish the required changes, as they themselves also recognised, can undoubtedly be clearly observed throughout this thesis as a serious constraint on the successful implementation of the Excellence project.

The improvement project has focused mainly on structural changes in the organisation. As an example of that some of the prioritisation for investment from the excellence project was directed to the reform or construction of new buildings. In some cases the construction of these new buildings has not been concluded, or the infrastructure needed for their utilisation has not been made available yet, and as a

result they still have not been used. While structural problems may be less complicated to resolve, there are other problems which require a more intricate solution. In addition, although important, especially with a structure which has been deteriorated along the years, the improvement of the infrastructure does not guarantee the improvement of the quality of the Institute.

The generation of scientific knowledge in the Amazon involves specific issues which makes the Institute a significant resource in its area. The organisation is seen as a reference centre in some areas of knowledge and for that reason some of the participants express the view that there is a need to have more investment in the organisation and more financial resources. An interesting view was expressed by Rogerio, who pointed out that:

> "it is an enterprise that involves a macro level government issue, to consider science and technology an important thing to the country and this cannot stay only at the discourse, there must be a correspondent effect on the national budget"

Additionally, other participants state clearly that there is still a lot of effort required to transform it into a centre of excellence and they have also pointed out other problems which hinder those attempts to make the necessary changes at the Institute.

> "it is necessary to commission and conduct more research and to give more incentives to researchers" (Henrique, ODA, Senior Researcher)

> "one very important obstacle to the achievement of the objective of this project ... is related to the personnel polices of the institutions" (Felipe, World Bank, Senior Researcher)

Although the Institute might be referred as an organisation that is important at a national level in terms of its scientific production, the evidence seems to suggest that at an international perspective it is not identified as a significant player. This could be related to the deficiencies that the Institute has in terms of its physical infrastructure, equipment, flow of resources and scientific production and

management. The actual structure in which the Institute is organised, under the intrinsic and strict bureaucracy of the Brazilian civil service, imposes many constraints on a more efficient management of the organisation. All those conditions appear to indicate that the organisation still has a lot of deficiencies and that the implementation of the programme has not been able to solve the numerous problems of the organisation.

The findings of this research demonstrate that there are strong concerns that the improvement project will not achieve its aim of reaching excellence. People from international agencies as well as people from the government have presented strong criticisms in relation to the scientific management and institutional policies of the organisation and its real abilities to make the desired changes. They mentioned problems which are likely to strongly obstruct the improvement process of the organisation.

The inability to retain good scientists, recruit new ones and dismiss people, a human resources policy which leaves the management of the organisation stuck with those rigid regulations, the lack of institutional competitive capability in some areas, the continuous lack of financial resources, the low productivity, the lack of motivation of the staff and the inability to attend to or search for the demands made on the organisation are all very significant problems which may become a serious threat to the future of the organisation.

The intricate and strict bureaucratic structure of the Brazilian administrative system to which the organisation is directed linked, as well as the institutional scientific management are some of the factors which hinder the organisational performance. Inserted in this overly restricted administrative system the Institute can not perform with the autonomy which is required for an effective change at the organisation. Having looked at the criticisms made by international agencies and governmental officials, as well as the constraints that the institution is embedded in, it is unlikely that the improvement project will be able to overcome the institutional problems of the organisation.

The evidence suggests that no significant improvement in the Institute's performance has resulted from the Excellence Programme. In this work, we have discovered several major reasons for this failure. One of the most prominent was the failure by those who designed the program to take into account the problems that were inevitable in the context of INPA. However, the inflexibility of the Brazilian civil service structure, particularly in the area of human resources, would nevertheless provide a very substantial barrier to the success of the project. These issues were avoided by the World Bank and other involved in funding this project, and would have to be resolved before the project could possibly result in substantially improved performance. Any project which does not deal with such issues seems to be doomed to failure, and it is interesting to ask why funding was not contingent on the required reforms being introduced.

This leads us to the question of whether any such project could result in sustained improvement in performance. The imposition of the westernised ideal of excellence has not yet been showing to be successful in situations such as that at INPA. Given the context in which INPA is embedded, the global nature of a concept such as excellence must be demonstrated before such projects can be deemed viable. It does not appear that this has been done.

Finally, the issue of the degree to which such a project can be successful with strong steering remain unclear. Given the distance between the authors of the project, and the culture of Manaus and INPA, it is inevitable that difficulties would arise. However, as one of the aims of the project is to change the culture of the Institute, some knowledge of the new culture being sought is required. Such knowledge is absent at INPA, and therefore a substantial degree of external input is required.

We can therefore say that there are very significant doubts as to whether such a project, which is primarily externally driven and funded, and imposes an ideology of excellence, can ever work in a society such as Brazil. We have identified the need to resolve the issues surrounding the Brazilian administrative system before any progress can be made.

The aim of this study has been to investigate an improvement process taking place in a Brazilian government funded research institute in the Amazon. The study has involved the use of the Total Quality Management and the Riggs' Theory of Prismatic Societies as the main theoretical frameworks. This specific approach is justified in several ways. I believed that the use of a solely managerial theoretical approach, such as the Total Quality Management theory, would not be sufficient to provide a wider understanding of the context in which this study has been carried out. For that reason the Theory of Prismatic Societies which analyses the context in which public organisations in developing countries are embedded was also made use of.

Given the fact that the improvement program at INPA was not following a formal Quality Management program the use of another supporting theory was also justified. In addition, Quality Management theories place strong emphasis on the culture of organisations which is usually seen as a positive feature for an improvement program to be successful. I believed that this framework would give me a strong basis for the analysis of the social, cultural and environmental context in which the Institute is situated at the same time as providing tools which would help to provide a fuller understanding of that improvement process.

This approach was also useful in order to explain some of the unexpected issues that had been affecting the implementation of the improvement program. The fact that the prescribed norms often diverge from the actual behaviour in emergent societies, a concept defined as 'formalism' in Riggs' Theory, proved to be an useful concept with several examples of formalism within the thesis.

Given that the improvement process of the Institute was not following a formal Quality Management program not all the variables analysed were drawn from that literature although some of them were analysed including those related to the definition of excellence and customers at the institution.

Quality management studies often analyse the definition of quality, and in this case, of excellence on improvement programs. The findings of this research demonstrate that quality can not be taken as a universal concept. The concept of quality differs in

different contexts and cultures. In the case of this study quality was not defined in single specific terms. The concept was usually not related to only one aspect or to specific scientific aspects but related in most cases to several aspects or even to very basic deficiencies at the Institute.

One way of analysing the variables solely drawn from the theoretical framework literature could possibly be analysing the indicators from the Excellence Project at the Institute. However, those did not seem to be relevant for this study to evaluate whether significant improvements have been made in the organisation. For instance, an improvement in the organisational infrastructure, which is one of the biggest investments of the program, although an important improvement, may not be a relevant enough indicator to measure progress.

For this reason this work used an alternative framework for the analysis of the improvement process at the Institute. The analysis of the outputs of the Institute such as its scientific production, its academic performance and the extent of dissemination along with analysis of some of the Institutional inputs (human resources, financial and political) I believed could help to reveal the extent of the impact of the improvement program at the Institute. Those indicators where chosen because they reflected the main activities of INPA which are to generate and disseminate scientific knowledge about the Amazon region. This framework would indicate whether any significant improvement in the Institute's performance has taken place as a result of the Excellence Programme.

Another important aspect in quality management is the attention that should be given to customers. This research demonstrates that there was a lack of a more customer-orientated approach at the Institute. We observed a lack of interaction between the Institute and its customers. The lack of interaction and the detachment of the Institute's activities from the local society seemed to be another significant criticism emphasised both internally and externally during this research. A significant flaw in this improvement program was not to address the development of mechanisms which could help the Institute to increase its interaction with the local community.

If the Institute wishes to build links with the local community, it must show that it can be of assistance to that community. This means that it must produce research of relevance to local people, and local industry, and it must find ways of educating the parts of the community that require the knowledge generated at the Institute. It is noticeable that there is very little input from non-academic society in determining what research will be done at the Institute, and there are no ways of ensuring that what research is carried out will prove to be useful. This is a substantial criticism of the project.

Should the Institute be successful in producing research that is of benefit to the community, this research is of no use unless those who require the knowledge can gain access to it. The Institute did set up a department responsible for dissemination, but it was only staffed by 4-5 people, and individual scientists were responsible for producing the materials to be published. This shows that, although the Institute recognises that dissemination is an area that requires development, it has not taken the necessary steps to ensure that it is a priority, and that the work produced is accessible to a non-academic audience. Another way that information could be passed out into the community would have been for the Institute to develop its extension programme. There is no evidence that this has taken place, and, for example, no more classes are available for members of the community than there were before the Institute began the Excellence Program.

We can therefore conclude that there are steps that can be taken to build closer links with the community, but that little has been done in this case. Areas such as setting appropriate research agendas, and educating the community in the work carried out by the Institute needed much greater attention than was given. If this had been done, then further progress could have been made.

The improvement program at the Institute did not seem to take into account the obstacles which could not be avoided in the case of Brazil such as its specific culture and political context, the Institute's lack of autonomy and the inflexibility of the Brazilian public administration structure. The fact that the Institute is part of the Brazilian government structure imposes a lot of restrictions on its performance. This

lack of autonomy generates a substantial constraint for the organisation to make the desired changes.

While a TQM approach does not explicitly insist on the organisation that is to be improved being autonomous, we see that, in practice, it is difficult to implement a TQM approach without substantial freedom for the organisation to act. TQM requires that individuals throughout the organisation play a part in the improvement process, and diagnose the organisation's strengths and weaknesses. This requires all employees, including the most senior at the Institute, who are subordinate to others at the Ministry in Brasilia, to have the freedom to take the actions required to improve the organisation's performance. The lack of autonomy of the Institute, which, for example, prevented managers developing effective human resources strategies, is incompatible with this, and therefore with a TQM approach.

It also prevents the employees at INPA from developing ownership of the project, which is something that a TQM approach recommends, as many employees did not feel that the process would be successful due to the constraints placed on the organisation. The lack of autonomy prevented all employees from playing a full role in the improvement process, and the fact that the process had been imposed from elsewhere caused people to resent the process. These factors all prevented the project from being truly driven by those who were employed at INPA.

Accordingly, the findings of this research seem to demonstrate that considerable importance has to be given to analysing the characteristics of the institutional environment of organisations where such improvement processes are planned. This is an issue which must be considered in more detail in cases, such as this one, where the improvement process is externally imposed, perhaps by groups which do not have a detailed knowledge of the culture of the Institute, and the context in which it operates.

Improvement programs often place emphasis on measurement of performance. Such measures are important features for evaluating whether performance has improved and whether goals have been achieved. Although the improvement program at the Institute had defined a series of indicators related to the activities proposed on the

Excellence Programme there was a divergence between the programme objectives and the goals of the administration of the Institute. The Institute management goal of qualifying all its staff to PhD level was not among the goals of the Improvement programme, for instance.

The findings of this research show that there was a lack of agreement on the performance indicators for the Institute. Such situations are likely to result in a great deal of difficulty in the implementation of programmes of this nature where conflicting objectives may jeopardise the implementation of the project and where the monitoring of the organisational performance may be impeded by the lack of agreement of indicators of institutional performance.

This divergence resulted in very limited monitoring of the improvement of the performance of the Institute and of the evaluation of the success of the initiative. The rudimentary nature and poor availability of the organisational data has also contributed to this difficulty. It can be seen not only as major trouble from this project perspective but also as a constraint for the Institute to monitor its own performance. That is a strong deficiency at the Institute and it needs to be addressed since organised information related to institutional indicators might help the organisation to evaluate where and how improvements can be made.

This divergence among organisational goals shows us a degree of individualism and a strong conflict of interest in the organisational practices. In this kind of situation evaluative studies often experience a high degree of constraint given the multiplicity of interests and perspectives on important issues. Agreement on objectives might help a successful implementation of such initiatives.

Although the findings of this study are limited to the case studied due to the nature of the methodology used the results provide useful additions to existing knowledge on the subject. This research can be used to stress the importance of obtaining a prior knowledge of the social, cultural, political and economic reality of the context where such programmes are going to be implemented.

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APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

CLA	RES		MARCIO	LUCAS	ROGERIO	FELIPE
1	1 Form	30	Sou economista, na área de gestão de programas e projetos e sou funcionario do CNPQ.		A universidade onde me doutorei, a Universidade de Berkley.	Sou biologo, fiz o mestrado no INPA, curso de botanica tropical e fiz o doutorado na Universidade de Florida, em botanica e agricultura tropical.
2	21 Def Excel	26	Exc. e' aquilo que se faz muito bem. Para atingi-la, tem que ter infra-estrutura basica, RH capacitados e motivados, com essas condicoes vai atingir objetivos, gerar o melhor tipo de conhecimento, que seja aplicavel e traga resultado pra beneficiar a		Pra transformar em CE em algumas areas precisa de uma politica de fixacao de RH, de melhoria laboratorial, de recursos permanentes de manutencao dos institutos.	Talvez o caminho mais eficaz para transformar esses centros seria atraves da contratacao de uma massa critica de pesquisadores de renome internacional, atraves de editais internacionais, mas pra fazer isso voce tem que ter salarios
	Definicao 2					
2	37 Id. Trans	26				
	Id. Transf. 2					
3	3 Atividades	23	No MCT tem Coord. de Acoes Areas Priorit., vinc. a Sec. Des. Client. A Coord. geral PPG-7 e' MMA, tem 4 subprog, um e' C&T, cada subprog. tem 1 Sec. Tecnica. O subprog C&I esta' no MCT, sou secret. tecnico, a coord. do subprog. no MCT e' comigo			Tem pessoas q. gerenc proj., sou Task Manager do proj. Monit., Aval. e Dissem., proj. p/ desenv sist. de acomp. proj. do PP, tenho funcao adm. e tecnica, e' funcao nova, o staff tecnico e' Task Manr, e eu sou Task Manager e tenho funcao de analise
3	10 Trab Ins	23		12,14,17		
4	42 Infra Est	20				
4	38Proj/Pesq	20			5,9	
5	17 Comun.	19	Com. MCT melhorou, mud. e' diretor ser INPA, amaz., era mateiro, estudou e e' diretor, conhece de baixo, teve muito diretor ausente, com. era ruim, hoje ligacao grande, PPG-7 foi fundam, pouco ia la', vou menos 1v. mes, p/ acomp. proj, ident. prob, discut.			
5	Agenda Pesq	19	Tinha 240 linhas pesq., mediante discussao, e c/ governo e org. internacional querendo apoiar, vem mudando, nao facil. Agenda uma das coisas mais bem feitas, tem prog., proj., linhas definida. Conscient. e' processo em andamento, ha' mudanca d visao		Fez esforco p/ tracar conjunto de prog. e proj, havia fragmentacao, mais de 300 projetos, pouca visibilidade, montou 6 programas integrados com 6 projetos, foi passo importante pra colocar inst. como refer. nacional, e na pesq. dirigida aprovou mais proje	
5	43 Gerenc.	19				
7	20 Ger Rec	15		1	6	
8	14 Aval Ins.	13	25,37		14	
10	40 Politica	11	3			
15	9 Indic. Qual	5	16,33			11
18	15 Inter.	2	27,41			
18	16 Tom. Dec.	2	28		11	
18	29 Grau Sat.	2		Bom, nao tenho objecao. Nem sempre pessoas descontentes, quer dizer Diretor ruim, pode estar querendo fazer transformacao, aperta e leva a uma gritaria. INPA nao pode querer suprir faltas se nao e' obrigacao, como saude. Precisa ver e atender sua finalida		

APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

FERNANDO	HENRIQUE	GABRIEL	FLAVIO	RAFAEL
Eu sou doutor veterinario, especializado na fabricacao de vacinas, agora estou trabalhando a coordenacao da pesquisa aqui no Brasil, eu sou o coordenador dos programas.	Sou engenheiro florestal, responsavel pela supervisao da Programa da ODA, em formacao tecnica na area de meio-ambiente de floresta, tem estudos no programa de projetos de cooperacao tecnica, a maioria na	H - I studied geology, in our government research institute in Germany, I was the head of this program, than I was 5 years in England also as a scientific counsellor, then I work in aids	Entrei no ORSTOM em 70, como pesquisador estagiario, fiquei 9 anos na Costa do Marfim, em 79 voltei pra Franca, defendi a tese de doutorado em 82 e fui mandado pro Brasil pra um trabalho atuando em	Eu sou analista de sistemas. Nao tem pos-graduacao nessa area. E formacao em Brasilia, na Universidade de Brasilia.
CE e' um centro que dispoe de infra-estrutura bem desenvolvida, material pra trabalhar, trabalho de pesquisa bem elaborado, mais que 50% de pesquisadores com doutorado, orcamento suficiente, boa integracao internacional e volume	CE e' um centro que tem uma competencia de um grau internacional, e' uma garantia que os produtos sao da melhor qualidade, tem pesquisadores individuais, que tem uma competencia internacional, mas a instituicao no		CR e' um centro, onde tem memoria, laboratorios bem equipados em algumas areas cientificas, pra que possam ser realizado all pesquisas de primeira qualidade, e bons pesquisadores, e que pode ter acolhida de peritos que	Ter a parte administrativa e a tecnica bem estruturada, numa instituicao, no Brasil, e' um individuo para um objetivo, e na parte tecnica, e' um pesquisador fazendo uma pesquisa. Tem que ser uma organizacao trabalhando em conjunto para um
Acho boa a ideia, mas que a (?) nao e' a melhor, porque, nao sei como se escolhe CE, a gestao do programa e' feita com o Banco Mundial, com o Banco tem dinheiro e com o (?), o dinheiro do PPG-7, 90% e' da Comunidade Europeia. Acho q. demora muito, nao estou bem por dentro p/ avaliar, acho q. INPA como CE muito boa noticia, oportunidade p/ desenv.	A ideia acho estupido, entendo e concordo fortalecer, melhorar qual. do trabalho, mas nao sei que e' CE, a escolha do Museu e INPA, e' obvia, nao tiveram criterios, foram escolhidos pq sao do MCT, o projeto era administrado p/ MCT, ha' instituicoes melhor	We have projects where scientists work together, special programs, interests and kind of area, and that is what we are funding, specific things, ideas, programs and outcomes. I'm not well informed about this CE, because it is outside my work.	Houve a visao de fazer CE na Amazonia, precisava reforcar pesquisa, as instit. estavam em declinio, p/ falta de recursos, contratacao, pesquisadores sairam, p/ salario, dificuldades de Manaus, entao apareceu necessidade de apoio a esse reforco, p/ ser CR	Acho otimo, as institulcoes que cooperamos tem se tornado CE, p. ex., a EMBRAPA, centro de estudo do cerrado - CPC, se tornou um CE na pesquisa da agricultura do cerrado. Tinhamos projeto com USP na area de automacao de industria.
		I am scientific counsellor, for science, technology and environment. I was responsible for agreement with brasilian government, in Science and Technology, last year we revised and signed a new one, sent to parliament, was accepted and since 18/2 it is sett	Scientific consellor, responsible for the organisation in Brasil.	Negociacao com Itamaraty, solic. de peritos, equip., trein. no Japao, as solicitacoes passam pelo Itamaraty, especif. Agencia Bras. de Cooperacao, tento ajudar a negoc. entre INPA e Itamaraty pra solicitacao chegue ao governo Japao
			36	29
	15,16,17,18,19,22,31,32,5	3,4,5,6,7,8,9,10,14,15,20,25	31 a 36,39,40,41,42,43,44,45,46,47,48	6,22,29
28	8,9,11,39,40,44,10		14,16	
	29,30		9,10,11,15,18,19,17	
		18,19		

APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

JOSE	MARCIA	ANTONIO	MATEUS	GISELA
Fiz engenharia civil, no Rio Grande do Sul, especializacao em mecanica dos fluidos, vim trabalhar no INPA, fui para a Franca fazer doutorado. No instituto, cheguei em 1980, 17 anos, e como coordenador 1 ano.	Sou bioloqa, doutorado em zoologia, nao tem nada a ver a minha formacao profissional, a atuacao que estou tendo aqui, tem pouco mais de um ano que estou nesse departamento, formacao em	Eu sou biologo, graduacao em Ribeirao Preto, fiz mestrado e doutorado aqui no INPA, em Biologia Aquatica e pos doutorado no Canada na area de Zoologia, especificamente com a parte de	Fiz agronomia, no Jaboticabal, SP, e depois vim pro INPA, quer dizer fui primeiro pra EMATER, dai eu vim pro INPA, trabalhei 2 anos em Mato Grosso, no nucleo que o INPA tinha, vim fazer mestrado no INPA, em	Sou do tempo que se fazia curso de historia natural, e nao ciencias biologicas, formei no Rio de Janeiro, comecei a trabalhar no INPA, fazia mestrado, eu trabalhava com 2 areas diferentes, depois me dediquei
Quadros ser despedidos, renovar praticas de pesquisa. Deveriamos justificar recursos pra pesquisa, a administracao cobra resultados, mas em 2 anos pouca pesquisa se produz. Teria que ter infra-estrutura, material, os custos intelectuais e liberdade a	Seria a instituicao especializada em Amazonia, que tem a maior parte dos recursos humanos voltada pra essa area de interesse, seria a instituicao onde existe um maior numero de pesquisadores ou de pessoas envolvidas pra estudar	Excelencia no ponto de vista, da pesquisa cientifica e' um conceito uno, nao existe uma excelencia pra Amazonia, pros EUA e pra Europa, excelencia e' o melhor que se pode fazer num determinado ramo da ciencia.	Esse nivel de excelencia e' uma coisa muito relativa, porque passa nao so pela capacitacao da pessoa mas pela satisfacao dele, porque esse camarada quando esta treinado pra manusear o CE ele vai embora, nao vai ficar muito tempo, vai aposentar,	Quando tiver rede em comunicacao, teremos um predio de colecao, ter melhores condicoes pro trabalho fluir mais rapido, equipes trabalhando juntas, a base e' formacao do RH, (equipamentos) e' necessario.
Pra quem, e' valioso, mas CE internacionalizado, nao vai buscar o bem da populacao amazonica, coop. internacional pode ser vantajosa, tem infra-estrutura, mas na pesquisa temos dificuldades, a estrutura nao se renova,	Se interessa existir CE pra estudar problemas, tentar desenv. sustentavel nao existe outra melhor que INPA, pesquisa ha' 40 anos, mesmo fragmentada, existe informacao, pesquisa sendo feita e resultados sendo publicados, e' onde	E' estrategia p/ o investimento, e fundamental infra-estrut, gente qualif., CE p/ estudar relacoes e aproveitar rec., trabalhamos na fronteira conhecim/o, tem pouco lugar p/ fazer isso, floresta tropical Amazonia e' ultima, a preocupacao	O governo resolveu explorar Amazonia. Dava dinheiro, juros baixos, o INPA pesquisa, e conclue e' horrivel pastagem, mas politica govern., tira recurso p/ calar, resultados contrarios, nao interessa descobrir que nao e' bom. Precisava	Acredito que possa chegar a longo prazo. Pelas dificuldades, tem o G7, que entra com dinheiro, mas, um PPD, alguns projetos a verba custa a chegar, adquirindo microscopio, e' excelente, dentro do que possui, ja' e' uma excelencia pelo que
As atividades se separam em 2 ramos, a parte experimental desenvolvida c/ grupo tecnico, q. prepara equipamentos, sistema de medidas, e instala-os na floresta, depois analisamos os dados obtidos e escrevemos artigos, nosso laboratorio e' a floresta	A attvidade e' manter agenda de pesquisa, tinha mais 200 proj, no plan estrat, definiu 47 proj. em 9 prog., 1 coletanea do q existia, criamos PPI's, faco distribuicao e acomp orcam. de proj, participo reuniao de editais de proj, mando proj p/ avaliar.	Capacit. no INPA e' minha responsabilidade, a pos-grad e' parte do tratado de coop. amaz. entre Brasil/paises q integram Amaz., cursos recebem 2 alunos p pais, isso homogeneiza acoes Amazonia, ecossistema n~ tem limites, e' importante pessoal treinado		Trabalho c/ mariposas, to na coordenacao e curadoria de colecao de insetos, pedi exoneracao da coord., p/ dedicar a curadoria e pesquisa. A coord. requer reunioes, coordenar pessoal, docum. p/ dar ciencia e autorizar, prob. p/ resolver, custo de pesquisa
10		5,6,7,18	1,2,3	
Esta avancada em inform. e defasada em outros, acha lab obsoletos, conviv. c atual. est. de inform., e' contrasenso mas verdade, parece INPA privil. inform., antes de atual. lab, inform. tem seu lugar, so q nao vai desenv. ciencia, e' secund. com bom equi	Tem melhorado, mas ta invest. 1 estrut. que 10 anos nao tera quem trabalhe, forma mestre e doutor, eles n~ sao aprov., perdemos pesq. n~ repos, infra adeq, tera predios novos, mas equip. ta obsoleto, mat. e equip. da p/ resolver, mas n~ tem contrato p/ qu	Com recursos do PPG-7 esta contorn. prob., const. predios, p lab., equip. a maioria das areas tem estrut. raz., decisao imp. criar lab temat, pesq. Prec. inv. infra aquac., saude precisa resolver espaco, quimica de prod. nat., falta pessoal.	Amazonia tem biodiversidade imensa, regioes do mundo, nao tem materia prima, e dai a ideia nao internacionalizar, aqui tem principios biolog. ativos, que pode curar cancer, dai interesse CC, ha rec. intern., qual retorno q querem.	
	21			
Pesq. preocupa des. cien., n~ conhece bem prob. impostos p serv. pub., gera conflitos, quadro adm. e' limit., trab. forma imprec., dem., confusa, rar. obtemos equip. q interessam pq isso n~ interessa adm., dificuldade pode ser form. ou corporativismo	Complicada, falamos linguagem diferentes, mesmo trab. na adm. e' dificil colaboracao, pesq. estao area fim, pelas dificuldades financeiras, insat. geral, n~ sao muito dispostos colaborar, qdo pesq. sai p adm. colab. diminui, e' dificil, relacion. complic	Sit. comoda, diretor e coord. cientistas, fala mesma lingua, entende nec. pesq, tem prob. c/ pesq. e area media da adm., trabalhamos p/ aperfeicoar pessoal, p/ entender nec pesq. e pesq. formular melhor nec., vivemos prob. serios n/ adm. falar ling. dif.		Como tem hierarquias, tem reunioes c/ dir., coord. e chefes adm., dificil pegar todos p/ falar, tem q. ter hier., com. e' razoav. boa, tem INPANET, sist. com. elet., funciona raz. bem, recebe pub., discute assuntos c/ colegas, Internet e INPAELE de pesq.
	Com PE definiu-se 46 proj. dentro de 9 programas, PPI's, acabou sendo coletanea de coisas q. existiam, colcha de retalho, agora tem agenda de pesquisa com 47 projetos (PPI's), comecou 95, duraria 1 ano, aumentou mais 1 p/ terminar em 97, sobrou recursos		Existem PPI's, grupo e' obrigado ter projeto inscrito, agenda serve como subsidio p/ pedir recurso, pede X, aprova 1/10, distribui rec. p/ ativ., feito internamente, e' uma coisa boa, nao e' obrigatorio transparencia. Tem distrib., mas diretor precisa usa	INPA ta trab. com 1 agenda de proj., ta' caminhando bem, tamos comecando, erros vao aparecer, serao consertados, estamos lutando. E' import., ta comec. ficar bom, tomara que n~ pare, antig. n~ tinha agenda, e' um passo, e' utopico querer tudo
Est. centr, inf, qual, da' vant. adm., car. p/ obra, passo p/ inst. priv, orgulho e' obras, convive c/ xenof. dist., contras., disc. 1 pratica outra, est. c/ rec. ext, e pesq. n~ fav. pesq. estr., favor inst. nac., desse ponto adm. passiva, do outro ativa	Adm. imediatista, n~ tem org. p/ n~ ta apagando incendio, tem q. adm. dia dia e plan. est., aparece editais, correm todos, faz proj. q. n~ vem orc. ou n~ atende nec., n~ resolve coisa forma global. Buroc., cont, tinha q. ter dinheiro geral p/ pesq. ou tre	Adm. procurado viab. meios p/ pesq., lab. temat., formar RH alto nivel, viab. com. entre setor adm. e neces. do pesq., investe capac. ger, p/ entender q. e' pesquisa e nec. p/ viabiliza-la. Possivel reduzir pessoas c/ infra adeq., preoc. simples mas efeti	Tem faixa salarial, todos subiram, trabalha ou nao, ganha mesmo. Existe PPI's, grupos tem projeto inscrito, o gerente adm. tem lista, c/ programas, ha' distrib. de rec. p/ atividade, e' boa transp. Dist. rec. da uniao p/ proj. e' interna. Tudo publica-se	Vemos diretores sempre de fora, relacao colonizado colonizador na propria terra, devia acabar, pessoas tem capac. p/ dirigir inst., falhas tem. INPA c/ agenda proj. ta' camin. bem, comecando. Conhec. do Osorio do INPA e' excelente, tem curriculo bom
	11,12,13,14,15,16,17,18,19	11,12	7	7,8
	20			6
13	33		5	
			7,8	

APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

MAURO	MARCOS	CARLA	ALFREDO	GABRIELA
Formei em oceanografia biologica, fiz mestrado em Biologia de agua doce no INPA e doutoramento em Zoologia na Universidade de Sao Paulo, direcionei a formacao pra sistematica taxonomia de crustaceos	Sou administrador, mestrado em planejamento, nao cheguei a concluir, naquela epoca a atencao dada ao pessoal administrativo era muito menor, nao tinha quadro administrativo com disponibilidade	Fui pra USP, fiz estagio de 8 meses, fui trabalhar no Hospital Tropical com Leischmaniose, iniciei o mestrado aqui, e fui contratada em junho de 87. O doutorado e' aqui no Instituto em botanica, fiz mestrado em	Sou ecologo, pela UNESP, em SP, mestrado no INPA em 84, em Biologia com concentracao em Ecologia, e em 90 doutorado, no Pais de Gales, na Universidade de Bangor, sou doutor em biologia, com	Sou bioloqa, mestrado no Brasil, na area de Botanica, e doutorado sanduiche, metade no Brasil e a atividade de pesquisa na Franca, e trabalho, na area de bio palimologia.
Qualificacao e intercambio de pessoal; fortalecimento da infra-estrutura (equipamentos, rede de comunicacao, energia eletrica, material de consumo). Uma integracao com a sociedade (governo), para delimitar objetivos e	A pesquisa, falta estruturar, atender necessidades da regiao, que disponha da informacao rapida, consiga se manter com as proprias pernas. (qualidade pesquisa, atender necessidades da regiao, gerar conhecimento rapido, ter recursos		Alta qualidade vem nas instalacoes, da formacao das pessoas, recursos financeiros pra pesquisa de forma regular, porque tem que conseguir um equipamento ou buscar recursos, enquanto deveria trabalhar na pesquisa, ai' CE vai por agua abaixo.	
E' importante, e' maior inst. pesq. da amaz oc., e' importante, pela localiz, biodiversidade regiao. Precisa conhecer recursos, qualif. infraest., RH, e um centro q atenda neces de conhecer regiao. Estabelecer areas conhec, qualif. termos salariais.	Com a globalizacao, o tipo de pesquisa p/ sobreviver tem q. ser CE ou se agregar a um, cada vez menos recursos, so ganha bom, e' questao de soberania nacional, e tem cerebros c/ conhecimento da Amazonia, falta dar corpo, TEM QUE [illegible]		Dar condicoes p/ grupos fazer pesquisa de qualidade numa area de importancia mundial, Amazonia, a ideia e' muito boa, velo na forma de infra-estrutura fisica, predios, instal. hidraulica, eletrica, rede de esgoto, e dinheiro p/ pesquisa, processo competit	Acho otima, mesmo porque somos o maior instituto na Amazonia e como a ideia do G7 e' voltada a paises q. tem ainda flora, principalmente Amazonia, devemos aproveitar a oportunidade, receber a ideia e trabalhar em cima disso, a formar o instituto, um CE
No CE subgestor compon. gerenc. e manut. colecoes cient.: compra insumos p/ manut. colecoes. Gestor comp. assist. tec. ODA: equip de inform, e CD-ROM p/ bibli. Dissem inform: producao videos, equip. pra editar public., e consult. pra dissem. dados colecoe		Formula proj. de pesq., atualiza cronog., orcam., capta c/ cientistas trabalho de lab., reunioes, corre atras de coisas, trabalha artesanalmente, recebe visitas, da entrevistas, excursao, responde questoes fitoquimica, acompanha e cobra do pessoal trabalh	Basicamente sou a pessoa responsavel pelo tramite de recursos, financeiros, entre outras coisas o tramite de compra, recursos financeiros no INPA, por ex., as ligacoes telefonicas, fax, tudo isso passa na minha mao pra dar uma permissao	Como coordenadora desenv. ativ. de adm. e como pesq. ativ. de pesquisa, gerencio e atuo em proj. de pesq., participo na pos-graduacao de Bot. como prof. e substituta do coordenador. Oriento alunos de mest. e dout., tento conciliar todas atividades
3,4	1,68,20,31,32,71	12		18,21
Ta melhorando, tava condicao ruim, equip. obsol., falta equip., c/ proj CC, com direc. plan. p/ pesq integradas, ja consegue estab. prior., e atuar no sentido de comprar, equipar, ja definiu equip. q se quer, imp. equip. moderna, casos ainda e' deficiente	Talvez nos falte a estrut. adm. Na parte tecnica e equip, 2 predios novos, aquisicao equip, implantacao de lab. tematicos, acho que ja e' CC. Ate dez. implantamos incubadora de empresas. Fica dificil ser CE, nao tenho papel, nem pessoal na area de materia	Tem arvore caindo no pavilhao, nao cortam, nao tem Internet na sala, fax quebrado. Nao tem equipamento, ou estao ultrapassados ou quebrados. Falam em lab de biologia molecular, nao tem o infra-vermelho pra estudar o basico, nada se faz sem pesquisa basica	Tem 2 carros. C/ dinheiro G-7, melhorou est fisica, const. predios, c/ reforma Agron., lab. criados, espaco p/ estudantes. Comprou carros, equip. p/ INPA todo, equip sofist/caros, falta coisas menores, apar. oticos, mat. de inform., falta melhorar	Estamos processo de melhoria, acredito q. daqui 3 anos estej. mais estruturados p/ cont. trabalho, precisa reposicao RH, forma RH mas n~ insere no processo, ate' poder contratar seguramos pessoal com bolsas de fomento, pra q. realizem seus trabalhos
18,20,3,19	71		24,25,9	21,11
Adm., perdeu pess. qual., isso dific. e c/ mud. pesq, tram. proc. modificam, tem mais dificuldades absorver mud., mais dificil, com. pesq. e adm. e' pouco mais dificil, ger. prog. e pesq. e' pouco mais facil, lingua mais semel., imp. q detectou prob.	Com Internet melhorou bastante, mas a adm. ficou alijada, nao tem muito acesso a rede de noticias. Comun. na adm. nao e' tal agil qto na pesquisa, houve problema de contratacao, treinamento pessoal, nao treina pq n~ tem c/ substituir, precisa tempo		Inicio coord. e' dificil, exist. racha q ganhou e perdeu, ele e' mais mediador dos prob. internos, n~ poder de decisao, procuro n~ tomar atit. isoladas, norm. tem confrontos c/ coord. Inter. coord. c/ pessoas passa ser diferente, leva tempo p/ tratar cada	Temos meio de comun., Internet, fax, telefone e infra-estrutura estabelecida p/ favorecer a com., e' questao pessoal se tem interesse de fazer a comun., infra pra comun. acho que esta' muito bem estruturado, em rel. inclusive a outras instit. do pais
Trabalhava sem integracao, algumas pessoas procuram fazer interligacoes, ainda ha inercia. E' importante definir prioridades e direcionar pesquisa. Precisa de politica de governo p/ fortaler instituicoes da regiao e mais recursos ser aplicado aqui.			Pesquisador ta ligado a projeto. Pede rec. tesouro, vem 50%, libera so' julho. Proj. implementados 95, foi melhor ano, existia feedback, ficaram mais soltas. Recursos e' irregular, tem conseguir dinheiro, deveria trabalhar na pesquisa.	Projetos multi-disciplin. e inter-instituc. sao fantasticos, oportunidade de intercambio. Esta funcionando regularmente os PPI's, logo a coisa esta bem, pesquisador agora delimita atividades, minimiza tempo, respostas rapidas p/ comunidade.
		Direcao quer saber solucao, nao problema, acho elitista. Pessoa q. ouve e acata, outros n~, interessa area e recursos. Muda sist. e pes. adm., diretor ve quebrado, n~ atende pedido, reuniao inutil, isso emperra. N~ tem vontade, devagar, client. com. falh	Osorio leva c/ proj. pessoal, consulta, acaba dec., vant. ta' presente, falta hier., antigo coord. geral chamava p/ achar solucao, rec. tem tanto p/ gastar, dinamica maior, sentia + asses., prob. coord. tem ido Osorio, devia ir coord, falta Osorio bem ass	Direcao preocupada c/ infra, obras, rede elet., hid., e com., e na pesquisa c/ PPI, verba Uniao, ta' se adap. essa ger. qual. se implantando, agora proj direc. p/ tenha mais controle ativ., minimiza tempo, e realid. mais concreta, resp. mais rapida
			5,7,8	25
12,13,14	30,51			
25	8,9,56			
	73,74			14

APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

JOAO	EDUARDO	RODRIGO	CLAUDIA	FABRICIO
Sou formado em Ciencias Biologicas, na Universidade Federal de Vicosa, em MG, formei em 76, em 78 vim pra Manaus fazer mestrado em Biologia de agua doce, pesca interior, doutorado em SP em Ciencias	Sou engenheiro agronomo, Escola de agricultura do Ceara', em 85 fiz mestrado no INPA em Entomologia e doutorado foi em convenio com o Instituto Max Planck, sanduiche que desenvolve a parte pratica na	Sou farmaceutico, fiz doutorado na UNESP, naquele tempo nao tinha mestrado, a gente se matriculava no curso da USP, o orientador mandava fazer disciplinas, depois de um periodo de preparacao, fazia a tese.	Sou nutricionista, formada na Universidade Federal Fluminense, em Niteroi, Rio de Janeiro, tenho mestrado na area de ciencia dos alimentos, da Universidade do Amazonas, e doutorado na	Sou engenheiro agronomo, formado na Universidade do Amazonas em 1983, fiz mestrado em ciencia do solo, na Universidade Federal do Rio Grande do Sul em 1992, no INPA, sou funcionario desde 83, tem 14 anos no
CE, estrutura fisica, pra quem investir? vai globalizar? esse aue^ de CE, agora e' CE, o INPA ta cheio de dinheiro, de obras, e 1 milhao de dolares nao resolve, em termos de pesquisa, nao e' muito claro, que querem com essas modificacoes,	Excelencia significa ter condicoes otimas pra trabalhar, pra desenvolver pesquisas, ter pessoas capacitadas, equipamentos, pra ser CE, teria que ter poucos problemas, nao ter problemas basicos, carro pra excursao, nao tem, pra CE precisa	Gabarito, conhecimento, comunicacao, entendimento, educacao forte, ligacao coesa entre fenomeno e pesquisador. E' atendimento global das necessidades regionais, pesquisa que atenda necessidade imediata da	Excelencia pra mim e' aquele grau, aquele patamar desejavel, aquele que voce sobressai porque ja tem toda uma infra-estrutura em termos de pesquisa, de capacitacao de pesquisadores.	Excelente e' estar proxima da realidade, atenta as problematicas da regiao, capaz de oferecer respostas, alternativas, solucoes, a verdade deve ser uma busca constante, nao pode manipular, distorcer e interpretar errado
A devast. da floresta, indice cresc. da popul., ultima floresta tropical, se acabar tera problemas, p/ transformar em CE tem q. investir infra estrutura e equip., investem porque os ricos interessam na Amazonia, o que querem nao sei, o dinheiro e'	Acho a ideia muito boa, a Amazonia precisa realmente, entao acho que o programa tem sido muito bom, no sentido de estimular e ajudar nas pesquisas e de ter mais uma fonte de recursos.	tem q. ser, e neces., vira excelencia, ou passa ser uma faculdade, se e' centro pesq. tem q ser CE, se escola teria 2 obj.: ensino e pesquisa, e pesquisa fica em segundo pq aluno e' imediatista, vai haver resp pobre do pesquis., tem q atender neces.	Excelente, tradicao na Amazonia, se deve muito pesquisadores, aqui e' ilha, nao tem acesso como Sudeste, as coisas sao dificeis p conseguir, tudo importacao, nao tem acesso, so aereo, como CE vem consolidar ativ. ja desenv., um merecimento do que	excelente, pra CE, aval. desemp. melhorar infra estrutura, construir, equipar predios, cerebros atuantes, pessoal c/ desemp. inadeq. p/ funcao, enxugar, complem. funcoes neces. p/ um nivel de excelencia, ou vai ser dificil atingir excelencia, sem
Trabalho parasitologia peixes, publico desde 79, trabalho lab., oriento alunos, aula na pos-grad, sou do Cons. Nac. Protecao a Fauna, assessorar dec IBAMA import. animais exot., part. Cons. Tec. Client. INPA, 2 anos c/ coord., participo comissao de avaliac	O coordenador responsavel p/ elaborar e desenv. projetos, ver que esta' relacionado c/ area, responsavel p/ q acontece na parte adm. e projetos, mostrar INPA e departamento, proj de pesq q tem aplicacao c/ ind, recursos da coordenacao, distribuir ativ.	Coordeno extensao, dif. client., ACTA, livros, filmes, folhetos, atende publico, recebe ofic. pessoal, coord. educ. amb., Bosque, manut. plantas, animais, Casa Ciencia, prod, part. ativ. MCT Brasil, feira, dissemina produtos. Estou coord. e oriento alunos	Ativ. burocraticas, coord., avaliar, cont., Na pesquisa trabalha c/ diagnostico de cond. saude e nutricao de popul., avalio biodisponibilidade de nutrientes, defic. nutric., analise da composicao entro c/ minerais, determ. bioquimicas p/ aval. nutricional	Coord. exerce parte adm., apoio prog., excurs., parte trab. experim. e' desenv. em estacoes, o coord. faz estrut. operac. funcionar, controla freq., aquis. mat., equip., tem articul. coord. p/ prop. proj., estagios, trein., faz artic. cientifico-adm.
17	28,29,7	14,16,11	21	19
Na epoca militares, colocaram grande cientista, Dr. Kerr, o INPA cresceu, as moradias transformaram em lab, vamos receber esse ano predio novo. A est. fisica e' ruim, tem est. basica p/ desenv. trabalho, microscopio, material, n~ o melhor mas o que precis	Estrutura boa, razoavel se comparo c/ Uni do nordeste e sul. Infra-estrutura, muita vez falta muita coisa, o basico tem. Laboratorios, equip., transportes, dinheiro p/ excursoes, isso e' o basico pesquisa, minimo de mat. de lab, em geral consegue trabalha	Tem labs bons, ideais, alguns novos, pesq tem equip e mat., estao assoc. proj aprovado, faz parte todo, tem q atender metas, tem dimensao maior, temos q descobrir q. a soc. precisa, mais interessante a partic. INPA, parecia monstro, publico n~ tinha acess	Verbas G-7, ta conseguindo melhoria infra, rede eletrica, telefonica, Acta, qdo amplia linhas de pesq ou equip. necessita espaco fisico, tendencia e' criacao lab temat. Contr. servidores, mais rec p/ aquis. dados, equip, ainda limitados, n~ atendem ativ.	Tem q melhorar. Est. fis. melhor. Defic. equip. inf. Equip. lab passa inic. grupo. Pouco carro, n~ at. demanda, obrig. viab. trab. Rec. atrasa pode perdido safra. Rec. bib., tec. mod. permite, teve boa bib. prob. por limit. fin, tem resolv, aces. inf. dep
12		11	21	6,8,7,12,19
	A comunicacao e' relativamente facil, pesq. tem acesso a coord. na hora que precisam, de certa forma atrapalha trabalho do coord., que fica voltado p/ prob. adm., acesso tao facil q. complica, se reservar tarde p/ des. trab., tem q. ficar sala incomunicav	Ultimos anos perdeu pessoal precioso adm., com. nao e' tao facil, talvez facil, porque sao doceis, mas resposta talvez n~ seja melhor. Grupo muito e outro menos desenv, dificil conversar, entender, pesq. exigente, coloca c/ indiv. dotado, n~ obedece regul	Tem coord. de pesq., de proj., ger. de prog, chefias de lab na estrut., o contato inicial seria c/ essas pessoas, por reunioes, documentos, memorandos, ha um relacionamento, pesq. costuma respeitar ordem hier., dentro dessa escala da pra cumprirmos os obj	Norm. pesq. n~ tem auton. p/ trat quest. c/ outras coord. Coord. cabe manter equipe inform., mult. doc, dirigir questoes grupo ou pesq, exigir resp, est prazos. Qto + auton. da' pesq resolver questoes q emperram trab. melhor, se mov. muito partir inic. te
Tem PPI's e projetos, q. tem orcamento por ano. Proj. internac., apresentou projeto a fonte financ. interna. Max Planck, recebe dos PPI's (tesouro), mais que meu, WWF Smithsonian e ODA, e' pobre financiando rico, injustica, pouco dinheiro, problema serio	Muitas vezes dinheiro dos projetos nao e' liberado no prazo pra desenvolver pesquisas, e em geral e' insuficiente. Recursos pra manutencao nao tem como justificar no projeto, nao ha' verba p/ isso. Tem limitacoes, determinadas epocas nao sai n/ treinament		Tem q batalhar, fazer proj. p/ conseguir recursos, independente da Uniao. INPA tem pesq. capacitados p/ executar ativid., estamos bem, pq tentou articular proj. q. existiam p/ proj. + integrados envolvendo coord. e instit., dificil mas ja ta bem encaminha	Houve org. teorica, em areas, melhor articulacao inter-institucional, formar equipes multidisciplinares e busca rec. a outras fontes. Orcam. aprova, nao tem financeiro, e' pouco e imprevisivel, tem adequar cronog. pesquisa a rec, improv. p/ alcancar meta
Dif. trab. comp., falta q. bomb., INPA avancou, proj., tenho infra, mat. cons., so' 7 comp, miseria, G-7 n acha, coisas caminham, melhor cond. trab, 8hr aperto, adm. tem leis, ilicit, buroc, cont, pega coisa peq., serv n trab. lei protege, culpa INPA + ins	Projetos dinheiro nao suficiente e liberado no prazo, prob. adm. sao grandes, ar-cond. central, pra mim e' frustrante, precisa equip. func., energia. Direcao ta' caminhando, apoia pesquisa, procura G-7, contato c/ ele, reunioes, discutir, coord. consultad		Acho importante da direcao, o diretor iniciou praticamente carreira dele aqui, conhece os servidores, nesse aspecto ha' um envolvimento proximo, esta sempre disponivel, apesar de exercer cargo maior, acho importante esse envolvimento.	Osorio tem des. bom trab, acessivel, disposto colab., se asses. pessoas desprep., e INPA ficou fechado. Org pesq. foi avanco e exig., rec. aumentou, diz c/ q. trabalha. Infra e' reforco p/ capac. Salario pode desart. transf. Infra, prep. e manter quadros
11	9,10		8	
		6,14,15	14	
17				

APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

PEDRO	PAULO	RICARDO	MANOEL	FRANCISCO
Sou engenheiro de pesca, formado na Universidade Federal do Ceara', em 1984, em 89 conclui o mestrado em tecnologia de alimentos, atualmente estou direcionando meus objetivos pra sair pro doutorado	Sou biologo naturalista, mestre em ciencias, o mestrado fiz no Rio Grande do Sule em ecologia e doutor em ecologia de recursos naturais, o doutorado em Sao Paulo, tenho trabalhado no Instituto hg'37	Me formei engenheiro agronomo, conclui meu primeiro mestrado, me dediquei uns 3 anos a pesquisa agronomica e depois a atividades de gestao institucional, em 89 fui a Universidade do Para fazer mestrado	Contabilidade, estou pretendendo retornar, tenho a vida pratica na area, de servico publico, curso de especializacao, eu tambem fiz analise de sistemas, programacao de computadores.	Sou engenheiro de pesca, formado em 77 pela Universidade Federal do Ceara', pos graduacao na Universidade de Pesca de Tokio, Japao em marco de 85, depois fiz mestrado mas voltei ao Brasil, mas
Excelencia e' ser o melhor, na sua competencia, gerar o que necessitam, atrair instituicoes ligadas a regiao, oferecer formas de resolver problemas, estar dotados de insumos, formas de produzir, e com condicoes de trabalho. Quem pesquisa nao	O passo fundamental, e' ter infraestrutura fisica e laboratorial moderno, com equipamentos que permitam resultados e trabalhos de qualidade, e formacao de RH, a meta e' em 5 anos ter 100% de doutores, essa e' uma meta a ser		O supra sumo, naquela area dela, essas pesquisas que estao desenvolvendo, acho que e' excelente, pra transferir, porque nao adianta estudar, conseguir repassar, aqueles ensinamentos futuros, pra se aprender e utilizarem aquelas coisas	Excelencia, seria naquelas areas onde a instituicao e' forte, geracao de conhecimento, pesquisa, capacidade instalada de formar gente, tem que ser uma coisa boa, um negocio de alto nivel, onde se produza ciencia, vamos dizer
E' cabivel, otimo, deveriamos ser CE, gerar inform, ser espelho p desenv. regiao, reform. missao, exec. trabalhos, utopico INPA CE, melhorar infra, construir predios, energia, agua, telefonia, n~ preparado pros editais, tem q. renovar, buscar recursos.		CE, termo infeliz, elitista, exc p/ quem, p/ que, onde, como, o que e' CE pesq. na Amaz., pesq. na, sobre ou p/ Amaz, formar pesq. q. produz result. p/ ind. de pais rico, e' uma excelencia, manejar rec. nat., ter contr do q tem e tirar prov. dele e' outra	Eu acho que ele tem todos os elementos, tanto na parte de material, de equipamentos, essas coisas todas, ja esta se preparando para isso, voce tem que ser um CE.	Nao foi indicacao aleatoria, na regiao amaz. tinha merito p/ ganhar, CE na area, acho bom, precisa, nao investia infra, equip, contratar, perde pesquis., questao salarial, n~ segura pesquisadores alto nivel, s/ incentivos, salario baixo, custo de vida alt
Tem ativ. de coord. e pesquisa, dar inform., na pesquisa, a parte da tecnologia, elab. produtos, des. tecnica, aproveit. do peixe, cursos de posgrad, orientar alunos, curso, transf. tecn., asses., acomp., divulgacao de trabalhos, feiras, a pesquisa e' apl			Especificamente são essas, foi aprovado agora, o novo regimento do INPA, esse organograma, cada uma das caixinhas aqui voce vai ter tudo aqui, compete, tal, propiciar, coordenar os processos administrativos, qualquer coisa voce tem esse organograma	
15,16,18,12,13,14,15,16,17,18,19	1,8,9	2,6		8
Aquis. de equip. dificil, luta conseguir, n teve apoio transp. Deveria casar c/ est CPBA, peixe n~ compraria, agron pega fruto e traz, tem facilid. compra mat. consumo, mas equip., tem diminuido, cada um quer ter. Lab separ, n~ juncao, ligacao q. deveria.	Infraest. fisica, dotar de lab., instalacao adequada, capac. pessoal gestao, c/ pesquisa melhor posicionada, RH qualificado, tera' maior possib. captar recursos, e questao da extensao e divulgacao, transf. conhec. client. e daquele decodificado p/ sociedad		Trabalhei Min. da Agric, controle da imp. trigo americano e canadense, esse tipo de proj. c/ rec p/ desenv. proj. melhoria, equip, visitei locais p/ verificar aplic. rec., nunca vi um com experimentacao q. tem aqui, instrumentos, aqui tem muito aparelho	Precaria, n~ tem viveiro e tanque em no. e area sufic. p/ experim., lab. ruim, tem melhorado, nosso caso ta precario, est fisica e equip., necessita estacao piscicultura, lab, viveiros, abastecimento d'agua, recuperar est. civil, lab., sala pesq, de aula.
12	8,9,16,17	8,3		30,35,36,39,37,38
Parte adm. so anda se adm. se conhece, client., qdo conhecem trab + rapido. N~ sabe muito que outro faz, nao se conhece, pesq. so conhece chaves na adm, p/ ger. e coor. precisa conhecer sist, pessoal, client. existe, existiu mais ainda, agora questao sobr			Acho que a melhor possivel, qdo cheguei quis colocar q. em mat. de trab. sou humilde, n~ sei nada, aprendo coisa nova, servidor c/ outro aquer, vim p/ trab. e aprender, tenho recebido muito apoio, cargo desse tem q. ter discern. de ver urgente, excep	Vejo INPA uma instituicao madura, como nao tem contratado e idade media das pessoas e' um pouco avancada, as pessoas ja se conhecem, vejo como um relac. maduro, entre os coord., e entre coord. e pesq., hoje qualquer coord. tem um relac. muito bom
Temos projeto no PPI, eram 3, fizemos um pra todos, dividiram os recursos, % maior p/ projetos que pediu mais, e menor se pediu menos. O PE tinha que dar direcao, configurar p/ outro INPA, entrelacando as pesquisas, c/ menos projetos, + controlados.	Promoveu agregacao maior de grupos, formar grupos competentes, n~ podia c/ dispersao de conhecimento/atividade. Sist. editais, c/ recursos p/ assunto, reforca grupos estruturados. INPA influencia forcando rec. disponibilizar por editais, p/ concorrencia	Criaria programas abaixo das areas do conhec., p/ problemas da regiao. Houve aceno de rec., pesquisas da area concentracao pra essa outra area, p/ garantir dinheiro, duplicando o q. vinha sendo feito, continua sem resolver problemas, faz o q. fazia antes	Coordenacoes tem varios projetos, e o gestor de projetos tem o seu recurso. A gente faz o controle, presta contas. Tem um sistema com os recursos do tesouro, ficam no MCT, eles acompanham, se precisa alteracao, liberam. Maior parte rec. tesouro e' p/ pesq	Rec. p/ pesquisa atraves de proj. institucionais e admin. Rec. do tesouro, p/ proj. da Agenda, dividido p/ numero de projetos, pouco, ta organizado e funciona melhor. Precisa flexibilizar agenda p/ novos projetos. Atual diretor continua gerente de um proj
falta terminar		2	16	22
			5,6,7,8,9,10	11,12,32,33,34,38
			11	
	18,11,12,13,14,15,19,22,23		4	

APPENDIX 1 - TABLES FOR QUALITATIVE EVALUATION

CLAUDIO	CARLOS	ROSA
Sou biologo e mestrado aqui no amazonas, em 79. Em 79 eu entrei como colaborador, no INPA, no segundo semestre de 82 eu vim pra ficar, faz mais de 15'anos, tenho mestrado e o meu doutorado.	Sou Biologo, doutorado em planejamento, fui coordenador de Entomologia, mais de uma vez e agora estou num cargo que nao era a minha formacao.	Sou bibliotecaria, fiz o curso de bacharel, em Manaus, na Universidade do Amazonas, e de especializacao, na area de gerencia da informacao, pela Universidade Federal de Santa Catarina, terminei
E' reconhecido como CE em varias areas, tem o maior conhecimento da biodiversidade da Amazonia, e estamos dando condicoes pras pessoas se projetarem com as excelencias nas suas atividades, pra que os CE se consolidem, possam se		Pesquisadores com equipamentos bons, investir pesado em capacitacao de pessoal, investir em RH pra poder ajudar esses pesquisadores a fazer as pesquisas, equipamentos, manutencao, acho que o INPA vai ter que melhorar
		Atender com mais agilidade, acervo condizente com pesquisas, atualizar periodicos, equipamentos pra atender com dignidade, informacao atualizada, pra CE a biblioteca tem que melhorar o nivel, de
na condicoes p/ transformar CE, instrumental, que e' infraestrutura, que RH cresca nivel intelectual, tenha infraestrutura, voce tem CE, na infraestrutura, as obras, e tambem na pesquisa, tem que ter pessoas c/ condicoes de se projetar e pesq. nao	INPA perdeu gente, n~ repos, tem gente ativa pela pos graduacao, aluno, nao colega novo, CNPQ acena c/ bolsas, chama doutor, 700, define metas e objet., fica 300, tem eficiencia 50 +, nao impl. pq n~ tem pessoas, areas estrat, n~ capac., 300	Eu acho muito bom, e espero que a biblioteca esteja incluida, mas pra um CE nos vamos ter que melhorar muito.
Coord. se reportam a mim p/ chegar diretor. Ger. coord. pesq., p/ assuntos de proj. de pesq. Os prob. do coord., ele reporta mim. O obj. e' que pesq. sejam realizadas, o coord. geral ta atento p/ garantir q projetos sejam desenv. a parte cientifica e adm.	Acoes estrategicas coordena informatica, modernizacao, planej. estrategico e orcamentario, convenios, relac. inter-institucional, RNP do MCT, na parte norte, Ass. de prog. e proj., grupo de globalizacao, cuja funcao e' adequar INPA pra realidade pol e soc	Na prep. tec., faco entrada material, ler, ver assunto, codigo, palavra chave, atendo pessoas. Tento ident. prob. e prevencao, fiz diag. qdo assumi, prob. q eram urgentes, remanej. pessoal, recup. mat., obras raras, tem forma planej, prob. surge tenta sol
20,15,19	7,9	7
Tenho orientanda doutorado na UNICAMP, depois de trabalhar no Waxellplant aqui, tem q deixar estagiario analisar a lamina q esta' fazendo. A infra p pesq. e' deficiente, mas e' forte qdo compara c/ o meio ai' fora, n~ sabe a liberdade q. tem aqui pra pesq		Tem prob de falta colecoes, acervo n~ atual., fluxo inf. muita parada. Aumentou proc. COMUT, acervo n~ atende. N~ tem espaco. G-7 dest. verba p/ period. n comprou, preco extrap. valor. Autom, dispar. preco, tera' outra. Tem 386 c/ prob, e dois 486 lotado
10,11,12,21,22,23	9,18	
		Coord. pos-graduacao, trab. conj. p/ atender alunos, destina verba p material, se coord. fizesse isso estar. melhor. C/ pesq. bom relac., procur. auxiliar, tem prob. pesq. nao devolve livro, registra ficha do outro. Serie de falhas, prioriz. atender pesso
A agenda de pesquisa, e' enorme. Projetos ate o final do ano terao nova avaliacao, vao fazer apresentacao publica e ver as metas alcancadas. Os programas tem os seus projetos e as linhas de pesquisa todas do Instituto foram reunidas.	Programa c/ defin. clara, deveria trabalhar proximo, mas n~ conseguiu relacionam/o, colab. p/ pensar como instituicao, princ. social. Produto p/ socied., e' resposta melhor p/ q. pedir, n~ gostam mudancas. Tem poder, pq tem proj. PF e' objet p/ cliente	
8	10,12,13,16,17	5,22
9		7
14		
		11

Appendix 2 – Description of Objectives, Activities and Expected Outputs for INPA Project

ACTIVITY (a) – **INSTITUTIONAL STRENTHENING AT INPA**

(a.1) – Planning and general institutional support

- Objective:

  Implement a regular system of planning, monitoring, and evaluation (COPL) and strengthen annual budget preparation process and tracking of budget expenditures.

- Activities:

  1. Recruit technical personnel and interns;
  2. Purchase equipment;
  3. Contract consultant;
  4. Establish registers of research, projects, special contracts, scholarships; project presentation form; personnel procedures manual; and
  5. Training courses.

- Expected Output:

  1. Complete roster of research, projects, special contracts, scholarships; and
  2. Written personnel procedures manual.

(a.2) – Strengthen inter-institutional co-ordinating unit

- Objective:

  Improve co-ordination of scientific exchanges and technical co-operation.

- Activities:

1. Contract consultant;
2. Purchase equipment;
3. Hire and train technical personnel and interns;
4. Participate in training workshops; and
5. Prepare guidelines and procedures.

- Expected Outputs:

  1. Written internal guidelines and procedures manual;
  2. Written action plan to improve co-operation with other research centers; and
  3. Increased co-operation agreements.

(a.3) – Strengthen administrative co-ordinating unit

- Objective

  Update administrative procedures and instruct staff in their application; and strengthen staff capability to carry out basic administrative functions.

- Activities:

  1. Rehabilitate administration infrastructure;
  2. Acquire furniture and equipment
  3. Contract consultant to prepare:
     - Diagnostic of current procedures and how they help or impede research support;
     - Development of new procedures and forms; and
     - Technical assistance to staff for implementation of new system.
  4. Train staff:
     - 3 persons to participate in 2 months courses offered in Brasilia and Sao Paulo. Management of physical facilities, budget and financial control, human resources management.
     - 5 courses to be presented in Manaus

- Expected outputs

  1. New administration procedures, implemented and documented by written manual or guidelines; and
  2. Trained staff in more efficient administrative procedures.

(a.4) – Strengthen fund-raising foundation and develop fund-raising capacity and long-term

- Objective

  Develop and implement internal capacity to raise funds and secure them on a long-term basis to support projects and activities at INPA.

- Activities

1. Acquire necessary supplies;
2. Recruit personnel – contract consultant;
3. Acquire references materials and donor files;
4. Develop fund raising strategy;
5. Train personnel; and
6. Travel for training and fund-raising contacts.

- Expected outputs

  1. Written strategy and work plan;
  2. Written fundraising trip reports; and
  3. Up-dated filing with donor information.

ACTIVITY (b) – **RESEARCH INFRASTRUCTURE AND EQUIPMENT SUPPORT AT INPA**

(b.1) – Research infrastructure

- Objective

  A – Expansion and furnishing new laboratory space

  A1 - Prepare blueprint and project for new construction;

  A2 - Expand space for the Ecology Department;

  A3 - Spatially consolidate the Aquatic Biology Department; and

  A4 - Furnish new buildings.

  B – Expansion and furnishing collection space;

  B1 - Expand space for herbarium collection;

  B2 - Provide additional space for the Zoology collections and guarantee their safety;

  C – Installation of a fire control system

  C1 - Provide a safe working environment for the research activities carried out in priority research department of INPA;

- Activities

  A1.1 – Contract engineering firm;

  A2.1 – Renovate the agronomy building in order to moveagronomists and thus provide more space for ecologists in the ecology building;

  A3.1 – Construct new building; and

  A4.1 – Purchase furniture for new spaces made available.

  B1.1 – Install steel cabinet systems for specimens – two stories.

  B2.1 – Construct new building; and

  B2.2 – Move to new building and organise systematically collections.

  C1.1 – Install a fire alarm system in the Library, Herbarium I and II, CPD and the Collections building.

- Expected outputs

  A1.1.1 – Final project with blue prints for new buildings;

  A2.1.1 – 500 m2 new space for Ecology Department;

  A3.1.1 – Whole Department moved to new building;

  A3.1.2 – Integrated Aquatic Biology Studies;

  A4.1.1 – Functioning offices and labs;

  B1.1.1 – Improved and increased specimen space;

  B2.1.1 – Zoological collections organised and registered in new building;

  B2.2.1 – Demonstrated use of collections through publications and other services;

  C1.1.1 – Installed and functioning system.

(b.2) – Maintenance and management of collections

- Objectives

  A – Conserve efficiently the zoological collections;

  B – Improve storage conditions for collections;

  C – Conserve efficiently the botanical collections

  D – Increase the efficient use of herbarium space and improve the protection of the Collections;

  E – Upgrade collection management.

- Activities

  A1 – Purchase essential supplies and curate backlog collections;

  B1 – Purchase and install air conditioners;

  C1 – Purchase essential supplies and mount backlogs of plant specimens;

  D1 – Purchase standard size steel herbarium cases which will double the storage space available in the herbarium;

  E1 – Purchase electronic equipment.

- Expected outputs

  A1.1 – All backlog collections curated;

  B1.1 – Air conditioning systems functioning;

  C1.1 – Large amount of backlog botanical collections curated;

  D1.1 – Backlog of material currently stored in plastic bags inserted in new cabinets;

  E1.1 – Improved maintenance and cataloguing of samples.

(b.3) – Upgrading library

- Objective

  Update library holdings

- Activities

  1. Purchase equipment and materials;
  2. Install equipment;
  3. Train staff in the use of database searches.

- Expected outputs

  1. New acquisitions registered;
  2. Upgraded hardware and software available to staff for bibliographic searches;
  3. Improved access to information bases.

(b.4) – Improve equipment utilisation and acquisition

- Objective

  Increase efficiency of equipment utilisation and acquisition.

- Activity

  Inventory evaluation of surplus and needs of equipment maintenance.

- Expected output

  Physical description of equipment assets.

(b.5) - Modernise computer and network capabilities at INPA

- Objectives

  1. Define exact system objectives and requirements; and
  2. Modernise computer and network capabilities at INPA.

- Activities

  1.1 - Plan the specific needs of computer support (how many meters of what cable, Etc);

  2.1 – Purchase network structure, cables, computer systems, and licenses.

  2.2 – Install all equipment: approach the installation problem as concurrent activities then sequentially:

  2.2.1 – Contract and start ditch digging for cable, etc;

  2.2 2 – Install network cable to all targeted sites;

  2.2.3 – Install and activate nodes;

  2.2.4 – Link nodes to network.

  2.3 – Train staff through courses and technical assistance.

- Expected outputs

  1.1.1 Discuss the computing policies for INPA;

  1.1.2 Identify about 20 primary nodes;

  1.1.3 Identify what is needed and why, including vendors and prices (bids).

  2.1.1 Installed and system functioning;

  2.1.2 Computer and network system effectively utilised.

(b.6) - Improve transportation support

- Objective

  Provide ground and water transportation for field research.

- Activity

  Purchase one boat and three vans.

- Expected output

  Increased field work.

(b.7) - Field research stations – floating rafts

- Objective

  Provide adequate conditions to carry out field research dealing with rivers and Floodplains

- Activity

  Repair two existing floating field station so that they can be used for research and graduate field training.

- Expected output

  Floating field stations in working order.

(b.8) - Field research stations – terrestrial field stations (ZF.2)

- Objective

  Provide adequate conditions to carry out field research in dry land habitats at the ZF-2 station near Manaus, with special emphasis on silviculture.

- Activity

  Carry out: field installations, field materials, station maintenance, equipment maintenance

- Expect output

  Field station in excellent working order and being used by either researchers and/or graduate students.

(b.9) - Consolidate the engineering/maintenance co-ordination of INPA.

- Objective

  Consolidate the engineering/maintenance co-ordination of INPA.

- Activities

  Construct and furnish new building;

  Prepare plan to provide efficient maintenance services to buildings and equipment;

  Execute plan;

  Accompany supervision of civil works during project implementation with procurement firm.

- Expected output

  Functioning maintenance services unit; quality control of maintenance service and constructions.

ACTIVITY (c) – **IMPROVE HUMAN RESOURCES CAPACITY AT INPA**

(c.1) – Develop and implement a staff performance evaluation system.

- Objective

  Implement a staff performance evaluation system in order to provide incentives based on demonstrated performance.

- Activities
    1. Complete and test the staff performance evaluation system;
    2. Implement the staff performance evaluation system in the institution so that the resources available through the project for training, travel and scientific exchange are allocated following the criteria established in the staff performance system.
- Expected output
    1. Written staff performance evaluation procedures.
    2. Report on the first year test of the evaluation system indicating any awards and incentives provided.

(c.2) – Scientific exchange and training

- Objective

  Improve scientific knowledge of INPA researchers at the Ph.D. level so that they become competitive at the national and international levels.
- Activities
    1. Selection of scientific staff would be done according to the staff performance evaluation system;
    2. Participation of selected scientific staff in National and International Scientific Congresses, Short courses at national and international institutions, internships at national and international institutions.
- Expected output
    1. Written reports describing the outcome of staff participation.

(c.3) – Graduate program

- Objectives
    1. Encourage students to base their theses on data collected in the field rather than solely on laboratory research.
    2. Strengthen the INPA graduate by providing adequate classroom conditions to work on research analysis and logistical support to reach field training sites.
- Activities
    1. Carry out 50 excursions/120 people days/$5/day to pay for help in collecting data;
    2. Rent – 10 excursions/$180/day;
    3. Organise and carry out 25 field courses;
    4. Purchase classroom furniture, field equipment, optical equipment, micro-bus and 3 motorised canoes.
- Expected output
    1. Theses containing data collected in the field;
    2. Courses demonstrating that fieldwork has been investigated;
    3. Purchased and installed equipment.

ACTIVITY (d) – **DISSEMINATION PROGRAM AT INPA**

(d.1) – Dissemination of scientific information

- Objective

  A - Publication and distribution of research results;

  B - Organisation of a scientific meeting.

- Activities

  A1 – Publish "Acta Amazonica";

  A2 – Publish a series of scientific books and workshop proceedings;

  B1 – Invitation of selected speakers.

- Expected output

  A1.1 – 4 issues (= 1 vol.), 3000 copies, a c. 150 pp. Published;

  A1.2 – 1 book published (Scientific) and 1 book published (Workshop proceeding)

  B1.1 – Execution of the planned congress on "Fish Genetics and Biochemistry".

(d.2) – Extension program

- Objectives

  A – Extension publications;

  B – High quality film/video on INPA as a research institution and its role in conserving and managing the Amazon rain forest (Portuguese and English versions) (to be carried out jointly with the ODA technical assistance – section e.2).

- Activities

  A1 – Publish a series of semi-scientific books;

  A2 – Technical publications based on applied research of INPA;

  B1 – Develop film script;

  B2 – Film sequences at INPA, research sites and interviews;

  B3 – Purchase additional film sequences, especially natural history themes;

  B4 – Sound tracks;

  B5 – Edit film;

  B6 – Video copies of film for distribution.

- Expected output

  A1.1 – 30,000 folders, 7,000 brochures, 8,000 manuals;

  B1.1 – Written script;

  B2.1 – Filmed sequences;

  B3.1 – Purchased additional sequences;

  B4.1 – Purchase/record soundtracks;

  B5.1 – Master copy of film;

  B6.1 – Copies of film.

(d.3) – Support an in-house dissemination unit

- Objective

  Support basic equipment for the activities of the "Public Relations Office" directly relating to the above activities.

- Activities

  1. Purchase computer, laser printer and projectors.

- Expected output

  1. Cost efficient production of the above mentioned various scientific, semi-popular, and popular publications and efficient realisation of the training courses and scientific meetings.

ACTIVITY (e) – **POTENTIAL TECHNICAL ASSISTANCE FROM ODA**

(e.1) Support for study visits by senior staff and training courses in science development

- Objective

  Improve Scientific research.

- Activity

  1. Study visits by selected overseas scientists;
  2. Training courses.

- Expected output

  1. Improved and new skills added to the institution.

(e.2) Advice on dissemination literature to promulgate.

- Objective

  A – Produce technical publications.

  B - Produce film/video for education of diverse audiences.

  C – Provide assistance with basic desk top publishing equipment.

- Activities

  A1 – Prepare text and graphics;

  A2 – Contract production;

  A3 – Support from ODA consultants.

  B1 – Establish video documentation center;

  B2 – Acquire stock footage;

  B3 – Contract production.

  C1 – Purchase equipment and software,

  C2 – Train INPA staff in use of desktop publishing equipment.

- Expected results

  A1.1 – 25,000 folders, 6,000 brochures;

  B1.1 – Video in Portuguese and English;

  C1.1 – Equipped publishing unit;

C2.1 – Trained staff in desk top publishing techniques.

(e.3) Provision of abstract databases and training

- Objective

  Improve the equipment needed to provide up-dated information to the scientific community.

- Activity

  1. Provide CD reader and disks;
  2. Training from ODA consultants;
  3. Provide updates of disks.

- Expected results

  1. Improved access to information bases.

(e.4) Provision of advice and training in developing information from the collections.

- Objective

  A - Develop the capacity to use and manage the collections effectively.

  B - Increase relevance and multi disciplinarity of research based on existing collections.

- Activities

  A1 – Provide OFI database software for collections management;

  A2 – Provide training on use of software.

  B1 – Invite specialists to provide input to INPA staff in Biology, Zoology, Sociology and on the selection of multi displinary research themes based on existing collections;

  B2 – Provide training courses in use of collections.

- Expected outputs

  A1.1 – Improved management of collections information;

  A2.1 – Greater accessibility of samples for hypothesis generation;

  B1.1 – Formulation of a research plan identifying topics of development interest which can be assisted with reference to the collections;

  B2.1 – High quality research results.

ACTIVITY (f) – **PROJECT IMPLEMENTATION SUPPORT AT INPA**

- Objective

  Guarantee the efficient and timely implementation of the project.

- Activity

  Contract consultants in procurement, auditing and monitoring and evaluation to support project implementation.

- Expected output

1. Minimised implementation bottlenecks;
2. High-quality and timely implemented project.

Appendix 3 – Exchange Rate In Reais in relation to the American Dollar

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998
EXCHANGE RATE	0.000024	0.00015	0.0016	0.03	0.64	0.92	1.01	1.08	1.16

Source: IMF, 1999.